

*The Data Center*

# MIGRATION GUIDEBOOK



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## Executive Summary

The only thing that is predictably permanent is change. When it comes to the data center, change is standard operation procedure; data centers are (or should be) constantly evolving. That isn't new, but the pace of it is intensifying. Driving that accelerated pace are two factors: on the business side, computing power is increasingly essential to competitiveness; and 2) on the technology side, legacy data centers simply can't keep up with a digital universe that is doubling in size every two years.<sup>1</sup>

### Drivers of data center migration

As the way we do business continues to change at an ever-increasing speed, older, less flexible data center infrastructure stifles innovation – and businesses run the risk of losing their competitive edge. IT leaders, as partners with business, must anticipate and address changes needed to meet the requirements of a rapidly growing digital business. Consider: in a worldwide study by global research firm IDC, 97 percent of companies that had adopted high performance computing said they could no longer compete or survive without it.<sup>2</sup>

There are technology drivers behind data center migrations as well. Often, the rising demand for IT power from the business drives IT leaders to a data center modernization and/or consolidation project. Exploring those options means considering issues of spatial constraints and new technology-based solutions for storage, server, networking, data center convergence, and virtualization.<sup>3</sup>

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<sup>1</sup> IDC, *The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things*, April 2014. Available at <http://bit.ly/1jvQFck>

<sup>2</sup> Los Alamos National Laboratory, *Salishan Conference on High-speed Computing*, 2013. Available at <http://1.usa.gov/1MIFKg9>

<sup>3</sup> Gartner, *Data Center Modernization and Consolidation Key Initiative Overview*, March 2015. Available at <https://goo.gl/cjmc1K>

Sometimes, data center migration is about moving from a legacy in-house data center to a colocation data center – an opportunity for IT transformation. Other times, data center migration is about consolidating your data center footprint – an opportunity to reduce redundancies in resources and achieve financial savings. In both cases, data center migration can boost competitiveness.

## Data center migration approaches

So your company is migrating to a new data center. Your mission, should you choose to accept it: Migrate your IT infrastructure safely and securely, on time, in budget, without a second of downtime. To put a finer point on it: Move tens of millions of dollars and thousands of pounds of IT equipment from one place to another with no negative impact on the business. No sweat.

### There are several ways to carry out a data center migration:

1. In **“lift and shift” or “forklift” migration**, you do a backup, turn the equipment off, move it, install, and turn it back on again. The upside to this approach is that it is one of the least expensive approaches. The downside is significant downtime, which can be very costly.
2. A **“swing move”** involves setting up a pool of servers as a temporary system while you move the physical infrastructure then replicating your data at the new data center. It is a zero-downtime migration, but it is complex and capital intensive since it requires a duplication of infrastructure.
3. A **“logical move” or “virtualized systems”** approach is cloud-based and involves no physical moves at all. Like a swing move, it is a zero-downtime migration, but it is complex and capital intensive.

In this paper, we will be discussing physical data center migrations – lift and shift migrations or swing moves.

Data center migration isn't something you do every day. Even as data center migrations become more common – even if you've managed a data center migration before – each one is different and every one is complex. This data center migration guidebook will help you break down the sometimes-daunting project into a series of manageable tasks.

## ACROSS EVERY SUCCESSFUL DATA CENTER MIGRATION THERE ARE TWO CONSTANTS:

- 1) Buy-in from all stakeholders; and
- 2) a structured approach designed to minimize negative impact to the business.

Data center migration typically involves a wide range of internal and external stakeholders. For example, while the data center manager may focus on the logistical challenges of the migration, the CFO focuses on cost (of the migration, and of not migrating). The CIO worries about the transformational opportunities. Business units worry about downtime. Buy-in from all the stakeholders is essential from the early stages of a data center migration.

Data center migrations are highly strategic projects, complicated further by the fact that they must be executed with minimal impact to business operations (from SLA-guaranteed availability to data security requirements). Like any complex project, a data center migration is best broken into discrete steps and done according to a structured approach, with transparent communication between all stakeholders.

**With action steps and best practices, this guidebook is designed to be a roadmap for your data center migration – not the project plan itself, but a comprehensive checklist of the steps you'll need to take to succeed.**

## A Roadmap for Successful Data Center Migration

### Data Center Migration Part 1: Assessment

**Your organization is likely ready for a data center migration if:**

- The impact of the migration project on other aspects of the business is well communicated to the entire business
- Risk has been identified and classified, and data center migration budget and staffing requirements have been set according to the relative levels of risk
- All dependent systems that will be affected by the migration – including network, infrastructure, and software systems – have been accounted for
- Documentation – covering IT architecture, support structure, financial management, service level agreements, and maintenance contracts – is up-to-date and in one centralized location
- Processes and systems are in place to track performance, availability, service levels, and capacity
- A data redundancy system – complete with documentation – includes plans to recover data no matter what caused the loss (including, but not limited to, a disaster)

## Data Center Migration Part 2: Planning

### The players

- Identify the players – internal personnel and external contractors
- Establish a method of communication between all of the sub-teams and their project manager(s)
- Use a Scrum approach to manage the players involved in the data center migration

### The playbook

- Construct a project plan that tells everyone involved what to expect before, during, and after the migration

### The plan

- Identify and communicate the “big picture” to all stakeholders
- Coordinate your migration plan with the new data center installation
- Create a high level design (HLD)
- Detail project plans
- Finalize the high level design
- Put it on the calendar
- Beware the ‘gotchas’
- Practice

## Data Center Migration Part 3: Execution

### Final prep

### Teardown

- Final inventory
- The physical move
  - Qualified staff and appropriate packing materials are essential
  - Handle the data center infrastructure in accordance with manufacturer recommendations and National Institute for Occupational Safety and Health (NIOSH) guidelines
  - Use a Data Center Infrastructure Handling (DCIH) device

### Transit

**Re-assembly** – After all infrastructure has been reassembled, it should be turned on, reinitialized, and tested

**Post-migration** – Update the project team and all stakeholders with the status of the data center migration and a recap of the goals achieved

## Data Center Migration Part 1: Assessment

The first step in a successful data center migration is to assess your organization's readiness. An organization ready for data center migration part 2 (planning and design) is one with:

- Management and change control programs auditing changes in the environment
- An automated monitoring and management system tracking the IT environment
- Well-documented systems
- Active asset management systems
- Current data redundancy and recovery plans

Part of a readiness assessment is a review of current practices against known best practices. Areas to focus on include oversight and planning capabilities, risk assessments, documentation, processes, and data redundancy and recovery plans (a data center migration is effectively a controlled data recovery event).

### Readiness checklist

#### Oversight and planning

- The impact of the migration project on other aspects of the business is well communicated:
  - Stakeholders understand the basic requirements and value proposition of the migration
  - Industry regulations – and compliance ramifications – are accounted for
  - Stakeholder groups understand the migration plan and have committed the required resources
  - A project manager is dedicated to the migration

#### Risk assessment

- Risk to the following systems has been identified and classified:
  - Mission critical systems
  - Business critical systems
  - Important systems
  - Brochureware systems

- Dependent systems that will be affected by the migration – including network, infrastructure, and software systems
- Data center migration budget and staffing requirements have been set according to the relative levels of risk

### Documentation

- Documentation is up-to-date, in one centralized location, and covers:
  - IT architecture (configuration, startup, shutdown, backup and recovery for each asset)
  - Support structure (problem management, notification, and escalation processes)
  - Financial management (including asset cost information)
  - Service level agreements
  - Maintenance contracts

### Processes

- Processes and systems are in place to track:
  - Performance, down to the component level
  - Capacity
  - Availability and service levels of the IT environment
  - All changes in the environment

### Data redundancy system

- A data redundancy system – complete with documentation – includes plans to recover data no matter what caused the loss (including, but not limited to, a disaster). The data redundancy system establishes key information about:
  - Interrelationships between the infrastructure and the business
  - Most serious vulnerabilities
  - Critical nature of applications and data
  - Systems and mechanisms to mitigate risk
  - Data center and IT emergency teams
  - Vendor emergency response capabilities

One component of the data redundancy system is a detailed disaster recovery plan.

One outcome of the readiness assessment is an asset repository that reflects your current inventory, configuration items, and descriptive technical and business relationships between the assets. This will be your baseline as you prepare for the data center migration.

## RECAP - DATA CENTER MIGRATION PART 1: ASSESSMENT

### **Your organization is likely ready for a data center migration if:**

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- Risk has been identified and classified, and data center migration budget and staffing requirements have been set according to the relative levels of risk
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- Documentation – covering IT architecture, support structure, financial management, service level agreements, and maintenance contracts – is up-to-date and in one centralized location
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## Data Center Migration Part 2: Planning

Once you've determined that the organization is ready for data center migration, it's time to start planning. (As the saying goes, "If you fail to plan, you are planning to fail.")

### THE GOAL:

**“COMPLETE THE CHANGE WITHOUT ANYBODY IN THE BUSINESS REALIZING THAT IT HAS HAPPENED.”**

*– Rob Dagley, CTO, Global Technology Services, IBM*

A typical data center migration or relocation project can take 12-18 months from the decision to begin looking for space to the 'go live' date. Expect to put far more time and effort into planning the data center migration than you'll put into actually executing it. Data center relocation expert Kris Domich says that no less than 60-70 percent of the total cost of a data center migration should be devoted to planning.

Understanding risks, anticipating roadblocks, and ultimately planning for contingencies is essential to even the most well planned data center migration. In this section you'll learn how to do just that.

## The Players

### BEST PRACTICE:

Use a Scrum approach to manage the players involved in the data center migration. Scrum is an agile software development methodology, but its principles can be applied here. Essentially, scrum is about everyone working together as a cohesive team toward a common goal. (The term comes from rugby football, where a scrum is a tight-packed formation of players with their heads down who attempt to gain possession of the ball.)

### INTERNAL PERSONNEL

- Identify a single dedicated project manager – a person with both project management skills and the authority to serve as the point of escalation and ultimate decider

- Create sub-teams (each with their own project manager) for each of the major task areas – network, facilities, operations, applications, and systems
- Identify someone who will keep track of equipment that fails
- Identify a team of people who can be redirected to data recovery if needed – people familiar with systems administration, database administration, networking, and backups

#### BEST PRACTICE

**Identify a “gofer”** – someone to assist as needed throughout the project (running to buy more cables, picking up coffee, or finding the tool you just misplaced). Reward that person for performing a thankless but essential job.

### EXTERNAL CONTRACTORS

- A DCM is often the biggest, most complex project an IT organization will take on; outside help may be needed to augment your IT team during time-consuming relocation and testing, and/or to provide help in strategic areas
- Internal personnel will be in charge, but it can help to have extra people on hand who can, for example, securely transport and rack servers, storage, and network gear
- network gear

If you need to use contractors to carry out some of the work, include them in communication about the overall project, especially changes to the timeline

### COMMUNICATION

- Create a single document with all players’ contact information – and make this list available to the entire team (internal and external)
- Include names, roles, phone numbers (desk, mobile, and home), and email addresses for each player
- Include contact information for all outside agencies involved
- It is the project manager’s responsibility to establish a method of communication between all of the sub-teams and their project manager(s)

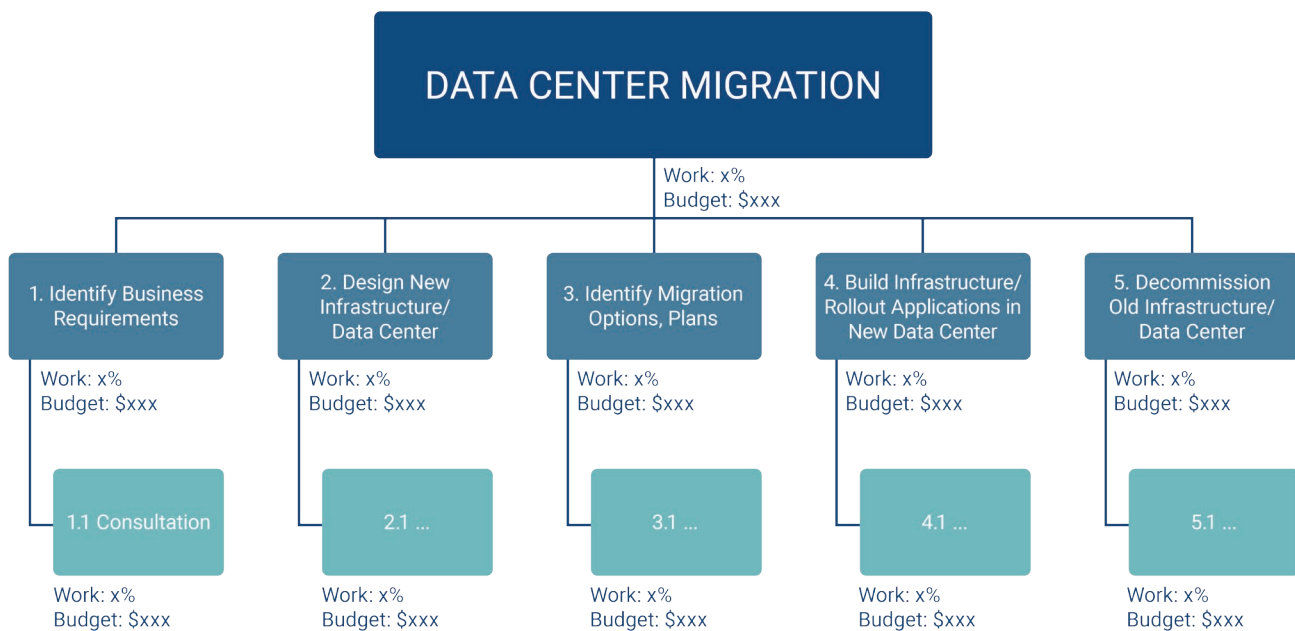
**BEST PRACTICE**

**Find space to work and share.** Create a collaborative project workspace for the team and create a hierarchical folder structure in your company’s knowledge sharing system to house the artifacts of the data center migration. This workspace should be accessible to external contractors as well.

## The Playbook

Whether you are an IT team of three or a Fortune 500 with ten times that many data centers, you’ll need to construct a project plan that tells everyone involved what to expect before, during, and after the migration. The size and complexity of the project should determine the format for your plan – it could be a formal document, an expanded checklist, a timeline, a flowchart, or a work breakdown structure (WBS).

The illustration below shows how the details of a work breakdown structure help to define and organize the data center migration. A WBS starts with the project as the top level deliverable and is broken down into sub-deliverables using a basic outline hierarchy. By allocating time and cost estimates to specific sections of the work breakdown structure, a project schedule and budget can be quickly developed.



Whatever format you use for your data center migration plan, developing it should be a team effort. You'll need input from all stakeholders, internal and external. Good communication up and down the chain of command and across all departments is essential.

## The Plan

### Identify and communicate the “big picture” to all stakeholders

- Work with all stakeholders to identify and communicate the business requirements associated with the data center migration
- Document the project assumptions and goals and share them with the team (everyone needs to be aware of the project requirements, limitations, and assumptions – and be working toward the same goals)
- Get consensus with key stakeholders around a strategy – and then communicate that strategy
- Develop and communicate a budget based on the agreed-upon strategy
- Create an activity checklist that assigns each member of each project team clearly defined roles and time frames to get tasks done

#### BEST PRACTICE

**Establish a dedicated support channel** and mechanism for both internal and external players to communicate during the implementation and the post-implementation stages.

### Coordinate your migration plan with the new data center installation

- Install carrier facilities, telecom cabling infrastructure, cabinets, racks, cable trays, and receptacles before construction is complete
- Install and test Internet connectivity, network cabling, power management, rack placement, VPNs and DNS
- Install and test swing equipment if you're setting up temporary systems at the target site
- Install and label channel cabling and patch cables for the initial moves

#### BEST PRACTICE

**Start fresh, start right.** When specifying the requirements for the new data center, look for opportunities to improve systems according to current technologies and best practices, and correct shortcomings that developed over time in your legacy data center.

**That said, take care to avoid one of the leading causes of data center migration failure:** confusing a data center migration project with a full infrastructure transformation program.

### Create a high level design (HLD)

- A high level design (HLD) is a roadmap for the system architecture and integration design; it describes the relationship between various modules and functions of the system
- A logical representation of the solution (data flow and data structures) is covered in the HLD
- The project manager should schedule a high level consult with sub-team leaders to act as a brainstorming session centered on high level design

### Detail project plans

- Each sub-team should develop its own detailed project plan based on the approved strategy and high level design; each sub-team should review all other teams' project plans

#### **Details to be addressed in those project plans include:**

- Risks, such as interdependent application complexity and unsupported (legacy) hardware compatibility
- A security design review (if determined necessary by the project manager) and – if security gaps are identified – necessary steps to eliminate the gaps
- Explicit plans specifying what goes where at the new site – from power distribution, enclosure count, and network and storage cabling, down to the rack-unit level
- The project manager should integrate all of the detailed sub-team plans, adding interdependencies and resolving conflicts between them where appropriate
- Applications and infrastructure should be logically bundled, based on interdependencies, to streamline migration activities and minimize the impact on the business

- Plot out major milestones and define contingency plans (developed in coordination with the business) in case the migration isn't completed within the pre-specified timeframe

## Finalize the high level design

### Put it on the calendar

Good scheduling is important – a successful data center migration requires tight coordination between business units and each project sub-team.

#### BEWARE THE 'GOTCHAS'

##### The 'gotchas' are typically in the areas of:

- Poor program management
- Inadequate baseline discovery
- Software licensing and compliance
- IP addressing and hardcoded IP addresses
- Too much parallel change
- Uncontrolled change and scope creep
- End-user access and security

**Change introduces complexity and risk.** Experience shows that data center migration programs tend to fail when they attempt to fix other business and technical issues at the same time.

*Source: IBM Global Technology Services*

## Practice

- Plot out the migration in a detailed script
- Walk through the script with all participants
- Every participant should know who is on their team and who the team leader is; when to show up; where to be; and what tasks they are scheduled to perform
- Personnel should know to check in and ask for permission before they leave
- Do a dry-run through the more complex aspects of the migration

## RECAP - DATA CENTER MIGRATION PART 2: PLANNING

### **The Players**

- Identify the players – internal personnel and external contractors
- Establish a method of communication between all of the sub-teams and their project manager(s)
- Use a Scrum approach to manage the players involved in the data center migration

### **The Playbook**

- Construct a project plan that tells everyone involved what to expect before, during, and after the migration

### **The Plan**

- Identify and communicate the “big picture” to all stakeholders
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### **Practice**

## Data Center Migration Part 3: Execution

This is where the rubber meets the road, as they say. If you've planned right, the actual data center migration should be a relatively painless process. In the simplest terms, the migration itself involves: final prep; teardown; transit; re-assembly; and post-migration.

### Final prep

- Perform and verify backups of all critical data
- Hold off on system changes immediately before and during the move
- Delay installation of normal upgrades; deploy upgrades for swing equipment if needed
- Test any new tech that will be used during the move
- If not already done, identify and cluster systems that can be moved together
- Prepare network and storage infrastructure for extension to the new data center
- Ensure the new data center is set up to receive incoming systems (for example, most migrations will require some new racks to be deployed at the target site)
- Ensure all warranties and insurance are up-to-date

### Teardown

#### Final inventory

- Perform and document a complete inventory of all software and hardware equipment to be moved; record equipment condition, size, weight, serial numbers, and any other pertinent information
- Label all assets – servers, switches, dongles, rail kits – as they come out of the racks
- Document “before” and “after” the network connectivity and physical location of each device; take photos of the old data center before the move and the new one, before, during, and after everything is set up
- Clearly identify equipment that isn't working (so it's not put back into service as is in the new data center)
- Some businesses need to lease equipment to create a duplicate environment to avoid downtime during the data center migration; if that's the case for you, clearly identify leased equipment



#### BEST PRACTICE

**Clean before you move.** As you inventory existing assets, identify and get rid of all the unused / outdated / broken assets. Dust off those servers before you move them.

### The physical move

- The typical server rack is not designed to be moved with servers still racked; you'll need to remove all equipment before moving it.
- Qualified staff and appropriate packing materials are essential – data center assets need to be packed, secured, and shielded from electrostatic and electromagnetic damage
- After you de-rack the equipment, pack it immediately and affix proper labeling on the package
- Handle the data center infrastructure in accordance with manufacturer recommendations and National Institute for Occupational Safety and Health (NIOSH) guidelines (to learn what those are, check out the whitepaper [Are You Using the Right Tools to Manage Your Data Center?](#))
- If you plan on getting a data center infrastructure handling (DCIH) solution for this move, order it well in advance.

## BEST PRACTICE

**Use a Data Center Infrastructure Handling (DCIH) device** – purpose-built for moving data center equipment in the data center – to mitigate the risk of equipment damage or personnel injury when moving IT equipment.

How do you tell the difference between a true DCIH and a general-purpose warehouse lift or materials handler? There are 14 factors that set a true DCIH apart:

- **Design intent** (Is the lift designed to be used in a data center?)
- **Load capacity** (Is the lift's rated capacity able to handle the weight of the IT equipment you need to lift or may need to lift in the future?)
- **Compliance** (Does the lift comply with local regulations and is it certified as such?)
- **Operating controls** (Are the controls easily accessible from a variety of operator positions?)
- **Platform stability** (How rigid and stable is the lift under load and when in use?)
- **Equipment positioning** (In which orientation does the lift position equipment?)
- **Equipment security** (Can the equipment be secured to the platform?)
- **Micro adjustment scale** (Is the lift capable of making incremental up/down movements?)
- **Lifting speed** (How quickly can a maximum load be lowered or raised?)
- **Platform range** (What is the vertical range – lowest to highest position – of the lift's equipment platform?)
- **Overhead safety** (Does the lift have safety measures to prevent damage to data center facilities and equipment?)
- **Braking system** (Does the lift have a braking system that effectively prevents rolling during lifting and install?)
- **Wheels** (Are the casters or wheels of the lift adequate for traversing the data center flooring without damaging it?)
- **Containment** (Does the lift have components that contain hazardous fluids or compounds that are restricted from use in your data center?)

**Learn more:** *Best Practices for Moving IT Department – 14 Specifications for Choosing a Data Center Infrastructure Handling (DCIH) Device*

## Transit

Be mindful of temperature and humidity differences between the data center and the outside. While you don't plan for the data center infrastructure to be exposed to outside elements, it's important to plan for contingencies – what happens, for example, if the truck breaks down and the outside temperature is 90 degrees with 80 percent humidity? (True story.)

Even with the best plans, accidents happen. Secure – and insured – transportation is critical to mitigate risk. Kris Domich, data center migration consultant, recommends conveyance-based insurance equal to or greater than the value of the conveyed assets.

## Re-assembly

Once the gear arrives at the new data center, unpack and inspect all equipment before re-assembling into racks. Take the same approach with re-assembly as with teardown: use only infrastructure handling devices that have been purpose-built for use in the data center.

After all infrastructure has been reassembled, it should be turned on, reinitialized, and tested.

## Post-migration

- Update the project team and all stakeholders with the status of the data center migration and a recap of the goals achieved
- Hold a post-mortem with project managers and sub-team leaders; review the migration plan and revise it to reflect what worked and what didn't
- Solicit input from stakeholders
- Create a detailed training plan for future data center migrations
- Track the benefits of the migration

## RECAP - DATA CENTER MIGRATION PART 3: EXECUTION

### **Final prep**

### **Teardown**

### **Final inventory**

### **The physical move**

- Qualified staff and appropriate packing materials are essential
- Handle the data center infrastructure in accordance with manufacturer recommendations and National Institute for Occupational Safety and Health (NIOSH) guidelines
- Use a Data Center Infrastructure Handling (DCIH) device

### **Transit**

### **Re-assembly**

- After all infrastructure has been reassembled, it should be turned on, reinitialized, and tested

### **Post-migration**

- Update the project team and all stakeholders with the status of the data center migration and a recap of the goals achieved

## Conclusion

A successful data center migration can propel a company into a stronger, more flexible position in a world that is becoming increasingly reliant on digital business. A data center migration gives IT leaders, as partners with business, an opportunity to direct that success.

No two data center migrations are the same. Use this guidebook as a guide for creating your own data center migration plan and, eventually, playbook.

## About ServerLIFT

ServerLIFT is revolutionizing the IT hardware industry worldwide with purpose-built, data center certified Data Center Infrastructure Handling (DCIH) solutions. ServerLIFT DCIH devices are built for precision, stability, and maneuverability in the data center. The most sophisticated data center operators in the world – the likes of IBM, Facebook, and Bank of America – rely on ServerLIFT.

**See for yourself. Schedule a live demo of a ServerLIFT DCIH solution:**

Visit [serverlift.com/ServerLIFT-Demo](http://serverlift.com/ServerLIFT-Demo) or call 602-254-1557.