IBM Global Technology Services
Resiliency Services

IBM Cloud Prefabricated Modular Data Center

Service Engagement Guide

IBM

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1. The service

What is IBM Cloud Prefabricated Modular Data Center (PMDC)?

Technology is now at the core of nearly every business. Cloud computing has become a growth engine for business and a required resource. A cloud environment can help provide new capabilities for mobile and social engagement, analytics-driven personalisation and real-time responsiveness.

Today, threats are everywhere, from simple power outages to complex data breaches, extreme weather events and earthquakes.

Even short outages can have huge impacts, including customer complaints, lost orders, clients and regulatory penalties. If disaster does strike, the cloud offers faster paths to recovery.

But cloud typically requires more powerful servers and more storage and it creates other hardware demands. What if your existing data centre cannot support the power, cooling and space infrastructure requirements needed for a private or hybrid cloud environment?

Rapid change in business and IT is now the norm. Your organisation requires an agile data centre infrastructure that can support your changing needs. Don't let your existing limited and outdated data centre infrastructure hinder your organisation's ability to benefit from a private or hybrid cloud environment.

Now there is a solution from IBM that makes implementing a private or hybrid cloud environment much easier and much faster and at a lower cost.

IBM Cloud PMDC uses the flexible modular approach of a PMDC to deliver a fully functional data centre designed to be complete, energy efficient and capable of supporting a cloud solution of virtually any type or size. This prefabricated data centre module can be installed and operated practically anywhere in the world in almost any environment. It has been engineered for cloud, and can come preconfigured with the cloud components of your choice.

What's more, this complete modular private cloud solution can be delivered to your location in six months or less. It would take 18 to 24 months or more to build a comparable traditional data centre, or to retrofit an existing one to meet the demands of cloud hardware.

Install a complete modular cloud solution in a fraction of the time with IBM Cloud PMDC. You only need supply a space to install it, power and data connections. IBM does the rest.

The challenges

To compete in today's business environment, organisations are driven to install high-density computing, increase their storage capabilities and create private cloud environments. But while these demands are realistic and required, they put tremendous strain on existing data centre infrastructure and IT teams.

Most data centres in operation today were built many years ago, and were not designed to support today's technologies. Cloud environments demand higher power densities and greater cooling requirements than most

existing data centres can easily support. For example, most data centres can support power densities of 2kW/rack to 4kW/rack, but private cloud configurations can require power densities of up to 24kW/rack—or more. In addition, the number one challenge cited by enterprise data centre operators is the need to reduce power consumption.[1] Most existing data centres are inefficient energy hogs that cost much more to operate than they should, impacting your bottom line.

You also need your data centre to be flexible enough to respond to change in a nondisruptive way, and to integrate both legacy and emerging technologies.

But the biggest hurdle is time. Organisations must adapt to change quickly enough to maintain a competitive advantage. Constructing a new traditional data centre or retrofitting an existing one can take 18 to 24 months and brings with it risks that can lead to project delays and cost overruns, not to mention the mess, disruption and safety issues involved with onsite construction.

Embracing new technology is key to innovation and survival for most companies. An outmoded data centre can impede that goal, which can affect your competitiveness. Alleviate these challenges and take the faster track to a private cloud environment for your business with IBM Cloud PMDC.

Why choose an IBM Cloud PMDC solution for private or hybrid cloud?

IBM Cloud PMDC allows you to quickly and easily expand your data-processing capability, create a more agile and resilient data centre, and increase your power densities all at a reduced total cost of ownership (TCO).

The standard IBM PMDC has been available since 2007. With a flexible and compact modular design that can be deployed quickly at virtually any location, an IBM PMDC offers an IT vendor-neutral, high-density computing solution. It supports any rack-mount technology and many non-rack technologies in a complete data centre solution that provides protection against external environmental

Figure 1. IBM Cloud PMDC offers a compact solution that can be installed anywhere, preserving your valuable interior real estate. The exterior can be matched to blend in with your building.

conditions, allowing installation and operation anywhere in the world. As needs evolve, the modular architecture can easily expand to support newer IT technologies, additional workload and business demands.

This modular approach provides a 'pay as you grow' solution that can be as small as a single, compact module supporting a few IT racks, or as large as a modular building providing a data centre space with all supporting infrastructure. What's more, it can come preconfigured with a private cloud solution designed to your specifications.

Using an IBM PMDC for your cloud environment can provide all the operational features of a traditional data centre but with a host of advantages:

- Provides a world-class private cloud solution, including configuration from the IBM Cloud Builder Professional Services team, ensuring complete cloud architecture plus the data centre infrastructure required to support and run your own private cloud
- Limits your operating expense by using the most energy efficient, modular infrastructure equipment configured and sized for your actual IT loads
- Is flexible, scalable and can easily grow to match business demands
- Can be up and running in less than six months you simply provide power, data connection and a space to install it
- Limits your capital expense build only what you need today; expand only when necessary
- Supports up to 30kW per rack or more to meet the requirements of your private cloud environment or other IT needs
- Can be installed and operated in any outdoor environment or indoors if you prefer preserving your valuable and potentially revenue-producing floor space.

2. Service components

Many businesses need to install cloud environments to help control their data processing demands and costs, but what to install, how to install, where to install and how to support it are all questions these businesses are asking. IBM can help make this a much easier process.

IBM modular data centre solutions take the best ideas for design, reliability and efficiency to create an optimised and more flexible data centre that can be deployed very quickly in a fraction of the time it would take to build a traditional data centre and at lower cost.

Although deployment of your IBM Cloud PMDC will be rapid, each IBM PMDC is designed and built to your exact needs and cloud specifications.

Complete preconfigured private cloud solutions

Each IBM Cloud PMDC is a complete cloud solution 'in a box' preconfigured with everything you need to quickly, easily and cost-efficiently establish a private cloud environment anywhere you need one. IBM Cloud Builder Professional Services are included with the IBM Cloud PMDC to supply a complete cloud solution, including:

- Compute, storage and network hardware
- Cloud management software/hypervisors
- Cabling
- Services
- Data centre infrastructure:
  - Critical power and cooling
  - IT racks
  - Security
  - Remote monitoring
  - Structure.

IBM Cloud Builder Professional Services experts will use their deep experience and unique configuration tools to work with your IT department to create the cloud configuration that best meets your needs, including the compute, storage and networking hardware, software, hypervisors, etc. required. We then run the power profiles for your required hardware to determine your rack space, power and cooling needs and design the IBM Cloud PMDC to support your cloud solution today and into the future.

Resilient, agile, efficient and cost-effective, these preconfigured cloud solutions can support x86, Cisco UCS and IBM PureFlex platforms with up to 10,000 virtual machines or more and can be delivered and operated in any environment, virtually anywhere in the world.

Platform	Virtual machines (VMs)	Rack units required	Number of IT racks	Total power	Power density	PMDC required	Recommended PMDCs
PureFlex	500 VM	18	1	6kW	6kW/rack	Cube	1 Cube (1 IT rack)
PureFlex	1000 VM	38	1	12kW	12kW/rack	Cube	1 Cube/10’ (2 IT racks)
PureFlex	2000 VM	58	2	24.7kW	12.4kW/rack	20’	20’ (3 IT racks)
PureFlex	10000 VM	138	4	95kW	24kW/rack	20’	20’ (7 IT racks)
x86	500 VM	68	2	15kW	7.5kW/rack	20’	20’ (4 IT racks)
x86	1000 VM	88	3	20kW	6.7kW/rack	20’	20’ (5 IT racks)
x86	2000 VM	209	5	41kW	8kW/rack	40’	40’ (10 IT racks)
x86	10000 VM	505	13	130kW	10kW/rack	40’	40’ (18 IT racks)

Figure 2. IBM offers a complete cloud ‘in a box’ solution. This table shows examples of preconfigured 500 to 10,000 virtual machine solutions on both the x86 and IBM PureFlex platforms. Any number of virtual machines can be supported in a PMDC.

You provide a space to install it, utility power and a data connection; IBM will take care of the rest.

Choose the PMDC that is the best fit

An IBM PMDC is a security-rich and environmentally isolated unit that can be designed and installed as a single unit or multiple modules joined together to create a large data centre or a small building. Additional PMDCs can be added as your needs grow. IBM PMDCs are built and tested in a factory under tight quality controls, so they are ready to go when they arrive at your site.

A major consideration is the type of PMDC that is best for your application. IBM has successfully been using International Standards Organisation (ISO) shipping containers as compact, outdoor data centres for many years. They have been deployed to many countries and environments around the world and can provide a robust, security-rich and portable data centre. However, because of exact size, shape and exterior requirements, ISO shipping containers can be limiting in what IT equipment they support, how the equipment is installed and the amount of service clearance space available within.

If you do not need portability, or require more design flexibility or space, consider a custom-built prefabricated module. These come in various sizes and can be wider, taller and longer than an ISO shipping container to provide more interior space. This allows better, more flexible placement of IT racks, power and cooling components, monitoring, security, fire suppression equipment and other requirements. Multiple modules can be joined to create endless possibilities. You can have a small, one to four IT-rack solution, or a large open white space for multiple rows of racks within an energy-efficient data centre.

Figure 3. Choose a standard ISO shipping container in 20 or 40 foot lengths, or prefabricated modules that can be assembled into modular data centre buildings.

Both the ISO and prefabricated modular solutions include standard, full-sized IT equipment racks to support installation of virtually any rack-mounted IT equipment, as well as unique format racks and non-rack-mounted equipment, such as mainframe computers and tape libraries. Both support almost any network solution, including both copper and fibre cabling systems, to help ensure your modular data centre can support multiple vendors' technologies.

Both types of prefabricated modular solutions are prebuilt in a factory under very tight quality controls by experienced teams. They are inspected and tested prior to shipment and you can request witness testing and can monitor construction. Modules can include not only IT racks, but also the complete cooling and electrical system (uninterruptible power supplies, power distribution systems, switchboards and more), security and fire protection systems and remote monitoring.

The IBM PMDC and IBM Cloud PMDC provide an 'always on' data processing environment in an agile, resilient and flexible data centre. The levels of redundancy can be varied to provide the solution that best meets your needs. Quick to deliver, energy efficient and cost effective, the IBM PMDC and Cloud PMDC offer all the features of a traditional data centre in a much more efficient and flexible format.

A major consideration and limitation in traditional data centres is the cooling capacity. For the higher power densities required for a cloud environment, this is of particular concern. However, the IBM PMDC offers flexibility and choice in cooling types, from direct expansion (DX) and chilled water to natural free cooling. This can be delivered via overhead coils, in-row cooling, or rear door heat exchangers, for example.

If your modular data centre will be housed in an earthquake-prone area, we can provide seismic isolation at either the module or rack level.

We help design, build and test your complete cloud solution as one comprehensive integrated system with all the IT racks and physical infrastructure components you need. We address the full range of your requirements by incorporating industry-leading infrastructure equipment from IBM's ecosystem of leading infrastructure equipment providers around the globe.

3. Deployment

When you choose an IBM PMDC for your private or hybrid cloud solution, IBM will work with you as a trusted partner from project inception to turnover. From determining your private cloud requirements with IBM Cloud Builder Professional Services to creating and reviewing the designs; from building and testing the solution to site preparation, installation, final testing, training and turnover; we are there for you every step of the way.

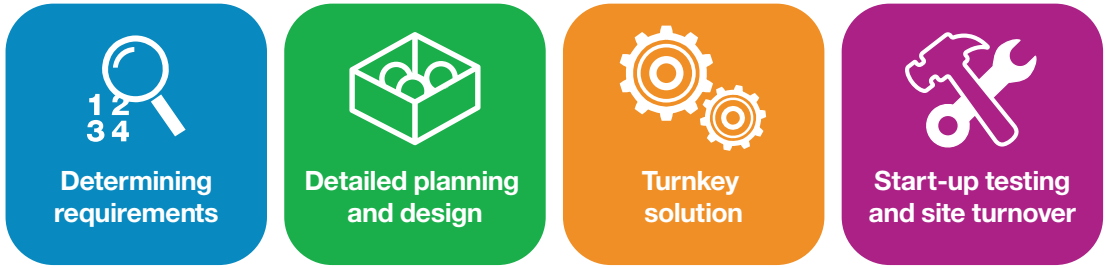

Figure 4. The steps to deployment of your IBM Cloud PMDC solution.

Throughout the deployment process, we provide end-to-end (E2E) project management expertise to ensure your goals are met. A combination of the IBM project manager and your appointed primary contact establish a framework for communications, reporting and contractual activities for your project, including an initial project plan and frequent status reports.

Determining requirements

What are the requirements for your new standard or cloud data centre? In the evaluation stage of your project, thoughtful consideration can help you achieve optimal results and avoid wasted time and expense. We will help you gather your design criteria. Things to consider include:

- Strategy
- Intended use
- Growth requirements
- Installation location
- Integration with your existing systems.

Detailed planning and design

We determine the design criteria for your PMDC based on your requirements and specifications. Then we develop a preliminary design drawing, followed by review and a final design. The final design will include the PMDC equipment layout, electrical design, mechanical systems, remote monitoring systems, fire detection and suppression, racks, power density, redundancy and installation requirements. Some of the items considered include:

- Flexibility; ability to support multiple technologies
- Scalability; to meet current and future needs
- Completeness of infrastructure systems
- Ability to be incorporated into existing or new facilities.

IBM supports enhanced client satisfaction and operability by implementing every detail into your final solution and conducting several design and construction reviews with your team.

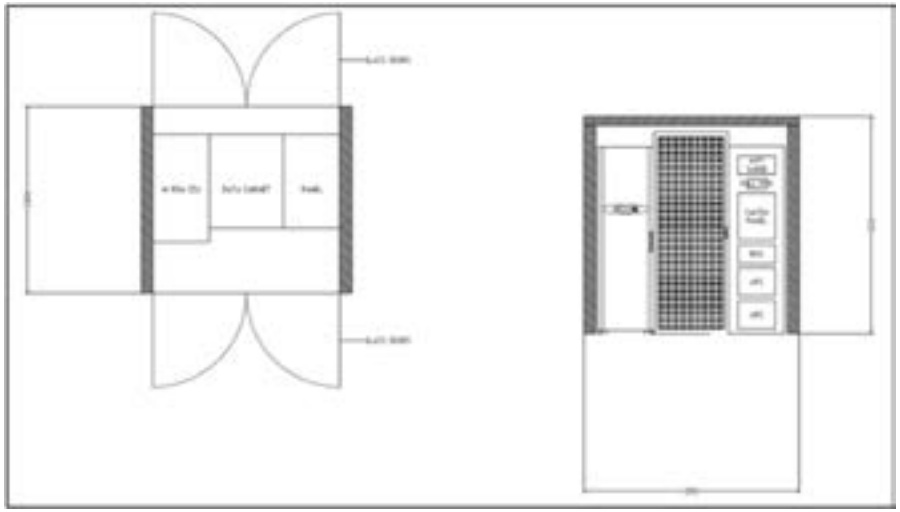

Figure 5. This drawing shows a complete IBM Cloud PMDC. This compact yet powerful solution includes everything you need: a preconfigured, single IT rack solution that can support up to 1000 virtual machines using the PureFlex platform or up to 100 virtual machines using the x86 platform, UPS power, cooling, power distribution, security and monitoring.

Turnkey solution

We translate your business, technical and financial objectives into a turnkey, scalable, modular data centre solution. IBM will design and build your PMDC unit according to your needs and specifications. This includes design, construction, electrical and mechanical services and can include infrastructure equipment such as a UPS system, IT cabinets, cooling units, security, monitoring, fire protection and a standby generator. We can then ship the PMDC unit complete to your desired location.

Depending on your needs, we can provide:

Equipment specification and procurement: We coordinate specification and procurement of the equipment you wish to be integrated into your PMDC unit. This includes ordering, scheduling and shipping to the designated staging location.

PMDC fabrication: Your PMDC is built at our factory according to the agreed-upon specifications.

Integration and configuration: We integrate the equipment you have specified into your unit, and then configure the components to function together.

Start-up and testing: We test your unit at the factory prior to shipment. Testing can include infrared heat scanning, simulation of a power failure, fire suppression and more. You can choose to be present to observe the testing and proper operation of your unit.

Site preparation: We can make your site ready for the installation of your PMDC, if you require it. This includes installation site design and engineering services, including connections to existing or new utilities in preparation for issuance of construction permits. We handle permitting processes for you. We can also provide site construction services, including concrete pad, walkways, ramps, landing area for the entrance and handrails. We can also provide landscaping services to incorporate the PMDC into your campus aesthetics.

Shipping services: We prepare the PMDC and components to be shipped and provide shipping of the PMDC to your location, including Importer of Record requirements and customs clearance (if required).

Site installation: If required, we provide a crane and rigging services to move, set and place the PMDC unit(s) and standby generator(s). We will assemble a PMDC enclosure, if requested. We provide electrical installation services to connect the PMDC to existing or new utilities, and installation of communication cabling. We also provide mechanical installation services for standby generator, HVAC and cooling systems, if required. Finally, we can configure and program the electrical and mechanical systems to function as an integrated system.

Figure 6. Shown is a nine-rack IBM Cloud PMDC solution. The racks are installed with three in-row cooling units in the white space; to the left is the mechanical room with the UPS, batteries, distribution panel, fire suppression and separate cooling unit. This is the interior view with the walls removed to show the layout details.

Start-up testing and site turnover

We install and test the PMDC solution, then train your staff and turn it over to you. If you desire, we can relocate existing IT equipment into your PMDC and provide migration services.

We perform start-up and testing of the solution, including electrical and mechanical systems, to verify proper operation. Integrated systems are tested to design requirements and standards. We provide training for your personnel in the proper operation of your newly installed equipment, based on your requirements.

Once testing and training are complete, we provide you with project closeout documentation, including operating manuals, warranty schedules, test results and as-built drawings for your records. Optionally, we can provide ongoing maintenance and service coordination, or operations centre support services.

4. Service delivery

Designing and implementing a comprehensive PMDC or Cloud PMDC solution requires many skills, including those of IBM Cloud Builder Professional Services, data centre and information technology experts, architecture and engineering partners, data centre and IT equipment vendors, mechanical and electrical contractors and utility providers and other services.

IBM can provide all this for you, allowing you to focus on your core business. We handle the behind-the-scenes work, so you benefit from the best data centre solution for your business needs, timing and funding objectives.

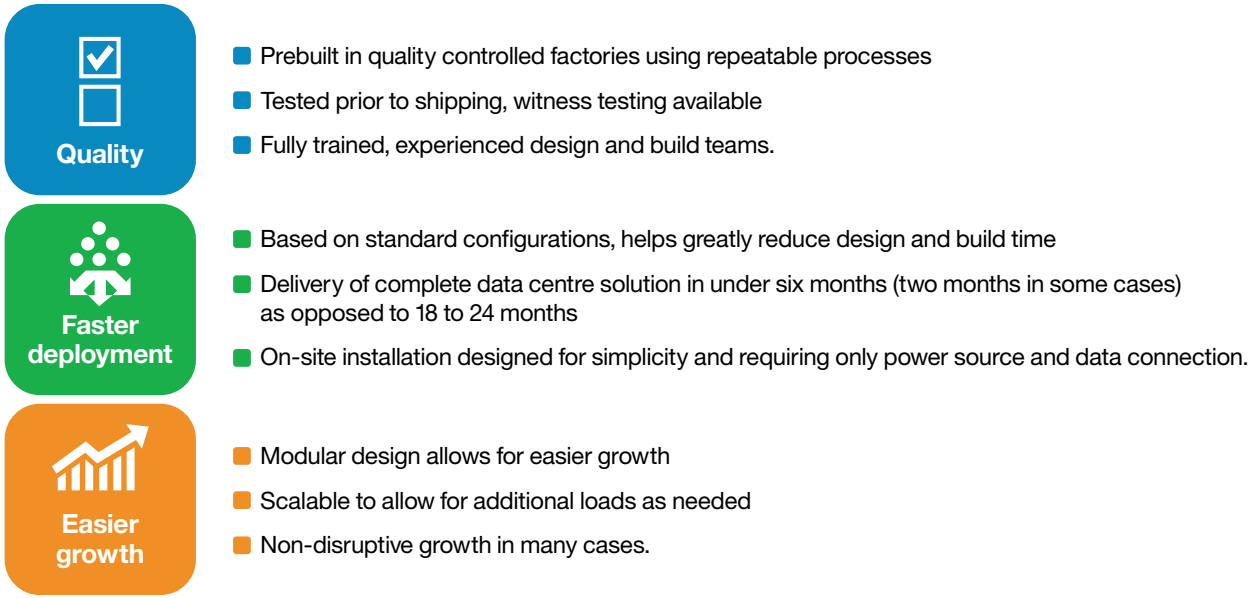

Figure 7. IBM offers vast experience and knowledge that cannot be matched by any other organisation. We apply this to our IBM Cloud PMDC solution.

Expertise from a global team

With experience building more than 30 million square feet of raised-floor data centres and actively managing over 6.3 million square feet of data centres for organisations worldwide, IBM is a leading provider of data centre design, construction, relocation and optimisation services. We bring this wealth of experience to the design and implementation of our IBM Cloud PMDC solution.

We have a dedicated team focused just on this business and a global network of alliances in facilities construction. Unlike general contracting or architectural firms, IBM understands the relationships between facilities, technology, operations and business. Plus we have a tested track record of technology leadership in modular data centre design and construction. Through designing, building and operating our own data centres around the world, we have developed real-world skills and experience that are difficult to match.

We are an all-encompassing provider of complete data centre solutions, but rest assured that you will experience the focus of a single point of contact (SPOC) throughout your project, making a daunting project easy for your organisation.

One client's story: BSH China strengthens disaster recovery with IBM PMDC

The need
Bosch und Siemens Hausgeräte GmbH (BSH) China wanted to bolster the disaster recovery capabilities of its two data centres located close together in Nanjing, China. Nanjing experiences severe thunderstorms and high temperatures in summer, with the potential for power outages and natural disasters. The company needed a third facility that was more remotely located.

The solution
IBM Global Technology Services (GTS) provided an IBM PMDCsolution, including design, installation and three-year maintenance service.

The benefit
IBM delivered the PMDC ahead of schedule, despite unexpected issues with Customs and installation, meeting the client's need for speed of deployment.
The client eliminated major construction costs, gained an additional layer of disaster recovery and was able to extend its normal data centre services for a lower TCO than would be available from competitors.

5. Getting started

A PMDC or Cloud PMDC contains nearly everything a traditional brick-and-mortar data centre contains except the possible construction delays, cost overruns, onsite construction mess and excessive space. It will let you get your private or hybrid cloud environment up and running in a fraction of the time, at lower cost.

It's easy to get started.

Contact us

Contact your IBM representative to talk about taking the fast track to an optimised private or hybrid cloud environment with an IBM Cloud PMDC solution.

Learn more

For more information about the IBM prefabricated modular data centre, visit our web page.

Download the white paper: Prefabricated modular data centre—add data centre capacity where and when you need it

Download the white paper: Best-practice strategies for designing and deploying modular data centres

Download the white paper: The next-generation data centre

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[1] IDC, "Improve Efficiency, Cut Costs: Top-line Results from IDC's U.S. Enterprise Data centre Survey," April 2014, #247735.

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