Data centre cooling must be a big consideration in the cloud-based data centre age. Poor separation of hot and cold air exposes the data centre to cooling energy inefficiencies (causing loss of cooling effectiveness), that can be caused by air leaking through cabinets (allowing hot air circulation back into equipment inlets instead of flowing into the CRAC units) and airflow obstructions (that constrict cooling airflow).

To combat these challenges, aisle containment systems that address efficient thermal management should be deployed. Efficient aisle control, as well as good environmental management, are key to helping a data centre to remain environmentally friendly. Cold aisle containment, for example, can reduce fan energy by 20–25 per cent, and deliver 20 per cent energy savings from the chiller, all while paying for itself in about two years, according to PG&E.

As rack heat densities increase, data centre managers should look for holistic cooling optimisation approaches such as airflow containment systems, cabinets with enhanced sealing features and energy efficient computer room layouts.

Seven best practices
The way data centres utilise their resources will undoubtedly continue to change as new technologies keep emerging. Furthermore, as more devices become integrated with the Internet of Things (IoT), downtime will not be an option. With this in mind, here are seven best practices to be taken into consideration:

- **Address airflow management**
  In airflow management, the separation of hot and cold air within the server room is the first critical step to maximising cooling system efficiency. The segregation of hot and cold air has the ability to improve chiller efficiencies, reduce the total plant cooling capacity, and create more hours of ‘free cooling’, helping justify an economiser that otherwise might not have provided adequate payback.

  There are three basic solutions:
  - A vertical exhaust duct at the top of the cabinet to remove hot exhaust air from the cabinet
  - Hot aisle containment, which is an enclosure built around the hot aisle that provides strong seal to minimise leakage
  - Cold aisle containment, which is an enclosure built around the cold aisle that provides strong seal to minimise leakage

  By specifying cabinets that can provide a complete front/rear seal around equipment, airflow through the equipment can be maximised. This typically requires an extra set of baffles for use within the cabinet, blanking panels for open rack spaces and a barrier at the base of the cabinet.

- **Track rack conditions and environmental variables**
  Keeping track of environmental variables will help create a more efficient rack design. Some servers generate more heat, while others may need more power. By seeing what system is taking up which resources, data centre managers can optimise their operations.

  It’s important to work with solutions that can provide the ability to look into the thermal and environmental performance of your infrastructure, giving you the ability to monitor, record and analyse environmental security and safety

- **Remove barriers to higher power/heat densities**
  Removing constraints around critical airflow design opens the door to higher power and heat densities. This isolation is accomplished by a combination of accessories such as blanking filling panels, equipment mounting area perimeter sealing, hot isles and cold isles cut-out brush seals and grommets, along with a system to remove the return air from the room into a suspended ceiling return air space.

- **Cold aisle containment**
  Cold aisle containment, which is an enclosure built around the cold aisle that provides strong seal to minimise leakage.

  While the cold aisle is the first critical step to maximising cooling system efficiency, the second step is cold aisle containment. This isolation is accomplished by a combination of accessories such as blanking filling panels, equipment mounting area perimeter sealing, hot isles and cold isles cut-out brush seals and grommets, along with a system to remove the return air from the room into a suspended ceiling return air space.

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Manually managed infrastructure data has a 10% error rate*, 20-40% of ports are forgotten over time**. The automated R&MinteliPhy solution continuously monitors each connection in one or more DCs or local networks, a (remote) central server records cabling status.

The AIM-based solution has functions for management, analysis as well as planning cabling and cabinets. R&MinteliPhy is easy to retrofit and can halve network monitoring and management costs.

Power monitoring
Power monitoring is not only about making sure you know how much power is being used, but actually helping make the environment more efficient. It’s essential to look for ways to save on power based on requirements. Intelligent power distribution units (PDUs) with monitoring capability that can stand the high heat loads of a high density environment can prove to be great assets, enabling the monitoring of voltage, current, power (kW) and energy (kilowatt-hour) levels with a ±1% metering accuracy for each PDU in the data centre.

Cooling monitoring
Tracking inlet temperatures against the latest ASHRAE guidelines and evolving equipment specifications is key. Ensuring that IT systems are running optimally will revolve around how well the environmental variables are controlled.

Monitor uptime and status reports
It’s imperative to check individual system uptime reports regularly and keep an eye on the status of various systems. Efficiency modifications can be made based on the status reports provided by a reliable reporting system.

Budget for new airflow and HVAC optimisation systems
With a ducted exhaust system, every bit of cold air produced by the HVAC system has to go through a server, so there is no waste. There is also no bypass or need for the overprovisioning that is required in standard hot aisle/cold aisle data centres.

In conclusion, taking this type of best practice approach, and adopting the latest technologies, will be vital in achieving a data centre capable of supporting the needs for future technologies’ demands. Organisations are going to have to start taking data centre infrastructure to a new level. The question is: Are they ready?