DATASHEET

cadence

Cadence Reality DC Digital Twin

Physics-based simulation software for the next generation of data center design and management to maximize operational performance

Cadence® Reality™ DC (formerly Future Facilities 6SigmaDCX product line) is a software platform for performance-aware design and operational planning of data centers through digital twin technology. The offering consists of two software solutions that enable designers, owners, and operators to balance the need for reliability and efficiency in data centers.

Cadence Reality DC Design enables engineers to design the next generation of data centers, inside and out, with physics-based simulation powered by computational fluid dynamics (CFD), while Cadence Reality DC Insight empowers IT and facilities management teams to collaborate on data center energy and performance optimization via a web-based portal when the data center is operational.

Cadence Reality DC Insight consists of two modules. This datasheet covers Cadence Reality DC Digital Twin.

Cadence Reality DC Digital Twin uses physics-based simulation to provide the visibility and foresight necessary to take control of data center performance (Figure 1).

Cadence Reality DC Digital Twin combines a detailed digital twin model with a powerful CFD solver. The digital twin model is calibrated to reflect its physical counterpart accurately.

To ensure it is automatically updated, it can be connected to live data and customer workflows from existing building management systems (BMS) and data center infrastructure management (DCIM) systems. Crucial data center insights are accessed via one user-friendly platform to enable teams to collaborate.

Figure 1: Cadence Reality DC Digital Twin showing simulation results of the cabinet thermal temperature plane

Benefits

- Streamline individual and collective efforts to manage data center operations and reduce response time
- Test deployment options and failure scenarios to study the implications of different power, loading, and cooling scenarios
- Make sustainable decisions with carbon usage analytics and energy efficiency report
- Integrate the digital twin model with environmental monitoring systems, ticketing software, multiple DCIM tools, and more for smooth operations and easy reporting

Features

Cadence Reality DC Digital Twin is an extension of Cadence Reality DC Asset Twin and includes all the features offered within it.

Capacity Visualization and Resource Utilization

Cadence Reality DC Digital Twin automatically calculates capacity, utilization, and resource availability across a wide range of metrics, including power, space, cooling, network availability, and weight. These calculations are used to visualize data center capacity, validate IT placement, and optimize data center space.

The software plots 3D space, cooling, and power views at the cabinet, cage, zone, or data center level so data centers can realize and ultimately control resource allocation. This functionality enables data centers to maximize current infrastructure and meet service-level agreement (SLA) and the business counterpart's computing requirements.

Cooling Strategies for Optimizing Operations

The software helps teams modernize legacy data centers and optimize new data centers. With its flexible modeling capabilities, it can model any data center configuration, including various cooling strategies, such as raised floors, non-raised floors, fan walls, both indirect and direct adiabatic evaporative cooling, and liquid cooling solutions.

Cadence Reality DC Digital Twin can also simulate modern control systems, including variable frequency drives (VFDs), primary/secondary configurations, and group or staged controls using temperature, pressure, humidity, or velocity sensors.

Figure 2 shows how Cadence Reality DC Digital Twin uses CFD to simulate airflow and cooling. This functionality is available across both design and operations, enabling teams to discover cooling performance inefficiencies, reduce deployment risk, optimize energy efficiency, and increase capacity utilization.

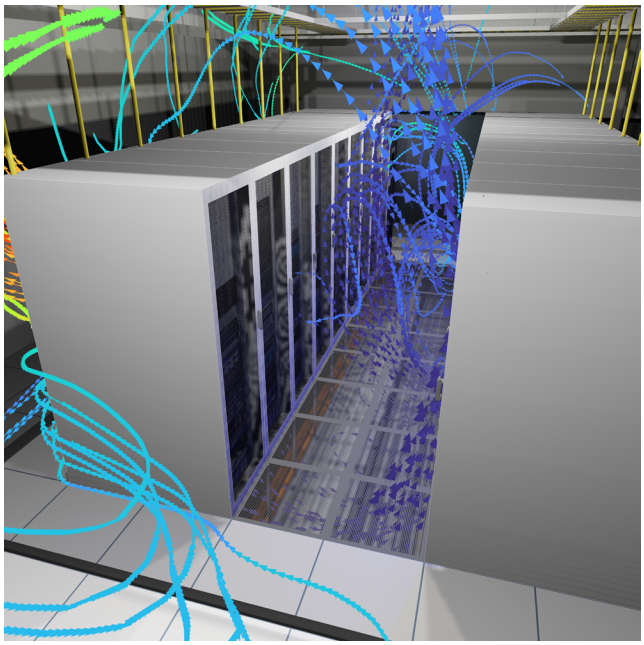

Figure 2: Airflow paths through the raised floor and room, simulated using CFD

Insights for Smarter Operation

Cadence Reality DC Digital Twin can schedule or automate tasks, such as running simulations, generating reports on current/future data center projects, creating custom reports and dashboards for different teams, and synchronizing updates between existing customer tools and the digital twin model.

The software can visualize power connections from utility to cabinet and cabinet to IT via the power network diagram (Figure 3). The software also retains key power metrics, including circuit phase type, distribution voltage, failover current, nominal power supply, and more. The software automatically checks the power system for overload to ensure safer power asset deployment. By connecting to live power monitoring systems, the software can aggregate and visualize historical data to help teams better plan deployments.

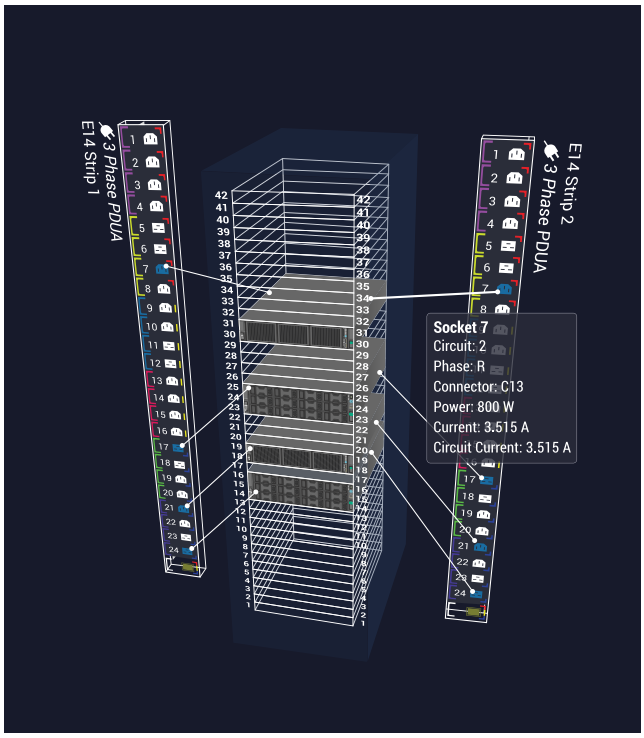

Figure 3: Cabinet view in web-based tool displaying IT connections and power information

The intuitive traffic light deployment assistance tool includes a "go or no-go" assessment system for IT deployment in the form of a traffic light system. This system considers the user's power, cooling, and space requirements, helping to identify suitable locations for deployment. Red indicates no availability for specified IT deployment, yellow denotes possible availability with some flags the user must consider, and green indicates availability for deployment (Figure 4).

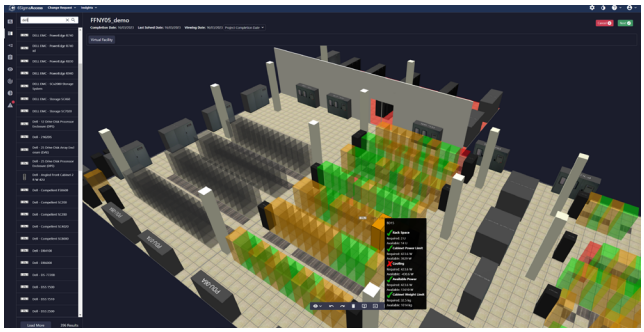

Figure 4: Traffic light system showing limited availability in the selected cabinet for deployment

Users can visualize the facility's performance with industry metrics, including ASHRAE standards, power usage effectiveness (PUE), and SLA compliance (Figure 5). The software can also plot 3D space, cooling, and power views at the cabinet, cage, zone, or data center level to understand the current resource allocation. Users can access carbon usage analytics and energy efficiency reports to help teams make sustainable decisions.

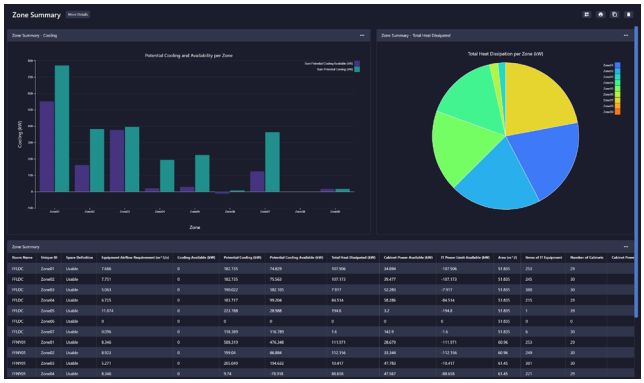

Figure 5: Dashboard showing metrics on cooling and space availability per zone