CONCEPT

Data Centre Design and Operations: Tiers, Power, Cooling and TCO

18 – 29 January 2027
Dubai - Five-star CBD venue



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Introduction:

Data centre design choices made early, from site and tier to power and cooling topology, fix most of the facility's availability, energy bill and lifetime cost, yet many organisations commit capital before comparing build, colocation and cloud options on a common basis. This Core Concept course gives data centre managers, facilities engineers and IT infrastructure engineers a structured method to design, operate and cost a data centre facility. Over two weeks participants build a Data Centre Design Concept and TCO Business Case for a facility or capacity need in their own organisation.

Course Objectives:

- Define data centre architecture, site selection criteria and availability targets using the Uptime Institute Tier Classification and redundancy concepts N, N+1 and 2N
- Specify the power chain and cooling design for a target rack density and redundancy level, from utility intake and generators to UPS, PDUs and containment
- Plan white space, structured cabling, physical security and fire suppression layouts that support capacity growth
- Run day-to-day data centre operations with DCIM monitoring, change control, maintenance windows and incident handling
- Build capex, opex and TCO models and compare build, colocation and cloud options with service contracts and SLAs
- Measure energy efficiency with PUE and operational KPIs and present a design and business case to decision makers

Target Audience:

- Managers responsible for running data centre facilities, server rooms and hosting sites
- Facilities and electrical engineers responsible for critical power and cooling infrastructure
- IT infrastructure engineers responsible for rack, compute and network deployment in data halls
- Infrastructure planners responsible for capacity forecasts and expansion projects
- IT service and vendor managers responsible for colocation, hosting and maintenance contracts

Course Outline:

Day 1: Data Centre Architecture, Site Selection and Facility Zoning

- Data Centre Facility Types: Enterprise, Colocation, Hyperscale, Edge and Modular Builds
- Functional Zoning Model: Data Hall, Plant Rooms, Meet-Me Room, Loading Bay and Support Areas
- Site Selection Scorecard: Power Availability, Fibre Routes, Water, Hazards and Expansion Land
- Critical Load Estimate from IT Demand Forecast to Facility Design Load
- Current-State Data Centre Assessment Checklist for an Existing Site

Day 2: Availability Tiers, Redundancy Topologies and Design Standards

- Uptime Institute Tier I to Tier IV Classification and Design Intent
- Redundancy Notation N, N+1 and 2N Applied to Power and Cooling Components
- Concurrent Maintainability and Fault Tolerance: A-Side and B-Side Distribution Paths
- TIA Telecommunications Infrastructure Standard for Data Centers: Scope and Structure
- Tier Target Selection Matrix: Business Impact of Downtime Against Design Cost

Day 3: Power Chain Design from Utility Intake to Rack

- Utility Supply Options, Medium-Voltage Intake and Transformer Sizing
- Standby Generator Sets, Fuel Storage Autonomy and Automatic Transfer Switching
- UPS Topology and Module Redundancy Selection for the Critical Load
- Power Distribution Units, Busway, Remote Power Panels and Dual-Corded Rack Feeds
- Power Chain Single-Line Diagram and Load Balance Worksheet

Day 4: Cooling Design, Airflow Management and White Space Planning

- Air Cooling Options: Perimeter CRAC and CRAH Units, In-Row Cooling and Outside-Air Economisation
- Hot-Aisle and Cold-Aisle Containment Layouts and Blanking Discipline
- Liquid Cooling Overview: Rear-Door Heat Exchangers, Direct-to-Chip and Immersion
- Rack Density Bands and White Space Floor Plan with Aisle Pitch and Clearances
- Capacity Planning Model for Space, Power and Cooling Headroom

Day 5: Cabling, Security, Fire Protection and Week-One Design Case

- Structured Cabling Topology: Main, Horizontal and Zone Distribution Areas
- Network Layout Overview: Top-of-Rack, End-of-Row and Carrier Entrance Routes
- Physical Security Layers: Perimeter, Mantrap, Access Control and CCTV Coverage
- Fire Detection and Suppression Overview: Aspirating Smoke Detection, Gas Suppression and Pre-Action Sprinklers
- Guided Design Case: Reviewing a Tier III Data Hall Concept Against Its Brief

Day 6: Data Centre Operations, DCIM and Maintenance Control

- DCIM Platform Functions: Asset Registry, Real-Time Monitoring and Alarm Management
- Change Control Board Procedure and Method of Procedure Documents
- Maintenance Window Planning and Preventive Maintenance Calendars for Critical Plant
- Incident Handling Runbook: Alarm Triage, Escalation and Root Cause Review
- Shift Staffing Model, Operator Rounds and Handover Logs

Day 7: Operational Risk, Service Contracts and SLAs

- Data Centre Risk Register: Single Points of Failure and Human Error Controls
- Colocation Service Agreement Structure: Space, Power Commit and Cross-Connects
- SLA Metric Design: Availability, Environmental Envelope and Response Times with Service Credits
- Maintenance and Vendor Contract Scopes for Generators, UPS and Cooling Plant
- Audit Evidence Pack for Facility Controls and Contract Performance Reviews

Day 8: Cost Modelling and Build, Colocation or Cloud Decisions

- Capex Breakdown: Land, Shell, Mechanical and Electrical Plant and Fit-Out per Kilowatt
- Opex Model: Energy, Maintenance, Staffing, Licences and Connectivity
- Total Cost of Ownership Model Over the Facility Lifecycle with Discounted Cash Flow
- Build Versus Colocation Versus Cloud Decision Framework and Sensitivity Analysis
- Stakeholder Map for Finance, IT, Facilities and Business Sponsors in the Investment Decision

Day 9: Energy Efficiency, PUE and Performance Benchmarking

- Power Usage Effectiveness Definition by The Green Grid and ISO/IEC 30134-2 Measurement Categories
- EN 50600-4-2 PUE Reporting and Metering Point Plan
- Efficiency Levers: Supply Temperature Setpoints, Economiser Hours and UPS Efficiency Modes
- Data Centre KPI Dashboard: Availability, Capacity Utilisation, Stranded Capacity and Cost per Kilowatt
- Benchmarking Review and Continuous Improvement Action Plan

Day 10: Capstone: Data Centre Design Concept and TCO Business Case

- Design Brief Confirmation: Tier Target, IT Load Profile and Growth Phasing
- Design Concept Assembly: Power, Cooling, White Space and Security Schematic
- TCO Business Case Model Build Comparing Build, Colocation and Cloud
- Executive Presentation of the Data Centre Design Concept and Business Case
- Peer Challenge Panel and Implementation Roadmap Finalisation

Skills You Will Gain:

- Site Selection Scoring
- Redundancy Topology Design
- Power Chain Specification
- Airflow Containment Planning
- DCIM-Based Operations Control
- SLA Negotiation
- TCO Modelling
- PUE Measurement

Why Attend This Course:

- Leave with a Data Centre Design Concept and TCO Business Case built for a facility or capacity need in your own organisation
- Compare build, colocation and cloud options with numbers that finance and IT sponsors can test
- Spend a second week on operations, contracts, costs and efficiency, the areas a design-only course leaves out
- Exchange design and operating practice with facility and infrastructure peers from banking, telecoms, government, energy and technology organisations

Conclusion:

A data centre is a long-lived asset whose availability and cost are set by early design and sustained by disciplined operations. Week one moves from architecture, site selection and tier targets through power, cooling, white space, cabling, security and fire protection to a guided design case. Week two adds operations with DCIM and change control, risk, contracts and SLAs, cost modelling, build versus colocation versus cloud decisions and PUE measurement, ending with each participant's Data Centre Design Concept and TCO Business Case.