Training Course on IoT and Edge Computing

Professional Development Training Course Outline

Category	CEOs and Directors	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The **Internet of Things (IoT)** and **Edge Computing** are rapidly transforming the global digital landscape, driving unprecedented levels of connectivity, automation, and real-time intelligence. This synergistic convergence empowers organizations to unlock immense strategic value by processing data closer to its source, minimizing latency, optimizing bandwidth, and enhancing security. Businesses across industries are leveraging these **disruptive technologies** to achieve operational excellence, develop innovative services, and gain a competitive edge in an increasingly data-driven world. Training Course on IoT and Edge Computing delves into the practical applications and strategic implications of integrating IoT and Edge Computing, equipping professionals with the essential skills to design, deploy, and manage cutting-edge solutions that deliver tangible business outcomes.

This comprehensive course will guide participants through the fundamental concepts, advanced architectures, and real-world implementations of IoT and Edge Computing. From understanding sensor networks and data ingestion to implementing **Edge AI** and securing distributed systems, attendees will gain a holistic perspective on harnessing these powerful technologies for **value creation**. Emphasizing **predictive analytics**, **real-time insights**, and **operational efficiency**, the curriculum is designed to foster a deep understanding of how IoT and Edge Computing can drive **digital transformation**, optimize business processes, and enable truly intelligent decision-making at the **network edge**.

Programme Curriculum

Training Course on IoT and Edge Computing

Introduction

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Course Objectives

Upon completion of this training, participants will be able to:

1. Master the foundational IoT architectures and Edge Computing paradigms for scalable deployments.
2. Design and implement secure data ingestion pipelines from diverse IoT devices to the Edge.
3. Optimize bandwidth utilization and reduce latency through effective edge processing strategies.
4. Leverage Edge AI and Machine Learning for real-time inference and autonomous decision-making.
5. Develop robust cybersecurity frameworks for IoT and Edge environments, ensuring data privacy and integrity.
6. Understand and apply industrial IoT (IIoT) principles for operational technology integration and automation.
7. Explore the role of 5G connectivity in accelerating Edge Computing deployments and use cases.
8. Implement predictive maintenance solutions using IoT sensor data and edge analytics.
9. Design scalable and resilient IoT-Edge solutions for various industry verticals, including smart cities and manufacturing.
10. Analyze the business value proposition of IoT and Edge Computing for cost reduction and revenue generation.
11. Evaluate different Edge Computing platforms and their suitability for specific applications.
12. Apply best practices for data governance and management in distributed IoT and Edge ecosystems.
13. Strategize for digital transformation by integrating IoT and Edge capabilities into existing enterprise systems.

Organizational Benefits

- Drive innovation and efficiency by adopting cutting-edge IoT and Edge Computing capabilities.

- Gain real-time insights from sensor data, enabling proactive decision-making and optimized processes.
- Process data closer to the source, minimizing data transfer to the cloud and improving responsiveness.
- Implement robust security measures at the edge, protecting sensitive data from cyber threats.
- Minimize downtime and extend asset lifecycles through proactive monitoring and analysis of equipment health.
- Develop new smart products, services, and business models powered by real-time data.
- Better manage energy consumption, supply chains, and asset tracking.
- Equip employees with the in-demand skills necessary to navigate the evolving technological landscape.

Target Audience

1. Professionals responsible for designing and implementing enterprise-level IT infrastructure.
2. Individuals involved in building and deploying IoT applications and systems.
3. Those who extract insights and build models from large datasets, including IoT data.
4. Decision-makers looking to leverage IoT and Edge Computing for operational improvements and strategic advantage.
5. Experts focused on securing distributed systems and IoT devices.
6. Professionals managing cloud infrastructure and seeking to understand its integration with edge environments.
7. Individuals responsible for developing and bringing new IoT-enabled products to market.
8. Those interested in the latest advancements and future trends in IoT and Edge Computing.

Course Outline

Module 1: Introduction to IoT and Edge Computing Fundamentals

- Defining IoT: Devices, connectivity, and data flow.
- Understanding Edge Computing: Why it's crucial for IoT.
- The synergy between IoT, Edge, and Cloud.
- Key drivers and benefits of adopting Edge Computing.
- Industry trends and the future landscape of IoT and Edge.
- **Case Study:** Smart Home Automation – How local processing on a hub enhances responsiveness and privacy.

Module 2: IoT Device Ecosystem and Protocols

- Types of IoT devices: Sensors, actuators, and smart objects.
- Connectivity options: Wi-Fi, Bluetooth, LoRaWAN, Cellular (5G).
- Common IoT protocols: MQTT, CoAP, HTTP, AMQP.
- Device management and provisioning at scale.
- Embedded systems and hardware considerations for the edge.
- **Case Study:** Smart Agriculture – Using LoRaWAN sensors for soil moisture and temperature monitoring in remote farms.

Module 3: Edge Computing Architectures and Deployment Models

- Centralized vs. Distributed Computing: The shift to the edge.
- Edge node types: Gateways, micro data centers, and on-device processing.
- Fog Computing vs. Edge Computing: Differentiating concepts.
- Hybrid cloud-edge architectures and their advantages.
- Containerization (Docker, Kubernetes) for edge deployments.

- **Case Study:** Retail Store Analytics – Edge gateways processing video feeds for real-time foot traffic analysis without sending all data to the cloud.

Module 4: Data Ingestion and Pre-processing at the Edge

- Strategies for efficient data collection from IoT devices.
- Data filtering, aggregation, and compression at the edge.
- Stream processing frameworks for real-time data analysis.
- Edge databases for local data storage and query.
- Handling intermittent connectivity and data synchronization.
- **Case Study:** Smart Factory Quality Control – Edge devices filtering out normal sensor readings and only sending anomalies for further analysis.

Module 5: Edge AI and Machine Learning

- Introduction to AI and ML concepts for the edge.
- Training models in the cloud and deploying them to edge devices.
- TinyML and resource-constrained AI.
- Use cases for Edge AI: Anomaly detection, predictive maintenance, computer vision.
- Model optimization techniques for edge environments.
- **Case Study:** Predictive Maintenance in Manufacturing – Bosch’s use of Edge AI to predict equipment failures, reducing unplanned downtime.

Module 6: IoT and Edge Security Best Practices

- Threat landscape for IoT and Edge Computing.
- Device authentication and authorization at the edge.
- Data encryption (in transit and at rest) for distributed systems.
- Secure boot, firmware updates, and vulnerability management.
- Compliance and regulatory considerations (e.g., GDPR, industry-specific standards).
- **Case Study:** Healthcare Patient Monitoring – Ensuring patient data privacy and security through local edge processing in hospitals.

Module 7: Industrial Internet of Things (IIoT) and Edge

- Understanding the IIoT ecosystem: Sensors, PLCs, SCADA.
- Edge Computing in manufacturing: Automation, process optimization.
- Predictive analytics for industrial assets.
- Digital Twins and their role in IIoT at the edge.
- Operational Technology (OT) and IT convergence.
- **Case Study:** Siemens' Amberg Smart Factory – Achieving near-perfect quality output through IIoT and Edge-enabled automation.

Module 8: Real-time Analytics and Decision Making

- The importance of real-time data for critical applications.
- Event-driven architectures at the edge.
- Alerting and notification mechanisms from edge insights.
- Integration with business intelligence (BI) tools.
- Closed-loop control systems enabled by edge processing.
- **Case Study:** Smart Grid Energy Management – Real-time analysis of energy consumption at the edge to balance load and prevent outages.

Module 9: Cloud-Edge Orchestration and Management

- Managing a distributed fleet of edge devices and applications.
- Centralized control planes for edge deployments.
- Over-the-air (OTA) updates for edge software and firmware.
- Monitoring and troubleshooting edge infrastructure.
- Hybrid cloud platforms for seamless edge integration.
- **Case Study:** Global Logistics and Supply Chain – Centralized management of edge devices in warehouses and vehicles for real-time tracking and inventory.

Module 10: 5G and Edge Computing Integration

- The impact of 5G on Edge Computing: Low latency, high bandwidth.
- Mobile Edge Computing (MEC) and its applications.
- Network slicing for dedicated edge services.
- Use cases: Autonomous vehicles, AR/VR at the edge.
- Deployment strategies for 5G-enabled edge infrastructure.
- **Case Study:** Autonomous Vehicles – Edge computing on vehicles for real-time decision-making, leveraging 5G for V2X communication.

Module 11: Edge Computing Use Cases and Industry Applications

- Smart Cities: Traffic management, public safety, smart utilities.
- Connected Health: Remote patient monitoring, smart hospitals.
- Agriculture: Precision farming, livestock monitoring.
- Oil and Gas: Remote asset monitoring, pipeline integrity.
- Retail: Customer analytics, inventory management, personalized experiences.
- **Case Study:** Smart Traffic Management – Edge devices at intersections optimizing traffic flow in real-time.

Module 12: Business Value and ROI of IoT and Edge

- Calculating the return on investment (ROI) for IoT and Edge projects.
- Cost savings through reduced bandwidth and cloud egress fees.
- New revenue streams from data monetization and smart services.
- Competitive advantage through enhanced operational efficiency.
- Developing a strong business case for IoT and Edge adoption.
- **Case Study:** Manufacturing Cost Reduction – Identifying and rectifying production line issues instantly via edge analytics, saving significant repair costs.

Module 13: Emerging Trends and Future of Edge Computing

- Quantum Edge Computing: Future possibilities.
- Federated Learning at the edge for distributed AI.
- Decentralized AI and privacy-preserving AI.
- Serverless functions at the edge.
- The evolution of edge hardware and software.
- **Case Study:** Collaborative AI in Healthcare – Federated learning models training on patient data at edge hospitals without sharing raw data.

Module 14: Developing an IoT and Edge Strategy

- Assessing organizational readiness for IoT and Edge adoption.
- Defining key performance indicators (KPIs) for success.
- Building a roadmap for phased implementation.
- Team building and skill development for IoT and Edge.

- Vendor selection and partnership strategies.
- **Case Study:** Enterprise Digital Transformation Journey – A step-by-step approach to integrating IoT and Edge into a traditional business.

Module 15: Capstone Project & Solution Design

- Group project: Designing an IoT and Edge solution for a real-world problem.
- Applying learned concepts to a practical scenario.
- Developing a solution architecture and implementation plan.
- Presentation of the designed solution and peer feedback.
- Discussion of challenges and potential improvements.
- **Case Study:** Participants will work on a simulated Smart City project, designing an edge-enabled solution for a specific challenge (e.g., waste management, public safety).

Training Methodology

This course employs a blended learning approach, combining theoretical knowledge with practical, hands-on experience to ensure deep understanding and skill development.

- **Interactive Lectures and Discussions:** Engaging presentations followed by open forums for questions and knowledge sharing.
- **Real-world Case Studies:** In-depth analysis of successful IoT and Edge implementations across diverse industries.
- **Hands-on Labs and Workshops:** Practical exercises using industry-standard tools and platforms for configuring, deploying, and managing IoT and Edge solutions.
- **Group Projects and Collaborative Learning:** Team-based assignments to design and prototype solutions, fostering peer-to-peer learning.
- Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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