

## Azure AI, IoT, ML, Remaining - Detailed Reference

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### Azure AI, IoT, ML, Governance, and Remaining Topics (Topics 82-102)

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#### **Topic 82: Azure Static Web Apps**

Hosting for static frontends + serverless APIs. Free tier available. Built-in CI/CD, auth, Functions.

#### **Topic 83: Azure AI Services (Cognitive Services)**

Pre-built AI APIs. No ML expertise needed. Vision: Computer Vision, Custom Vision, Face, Video Indexer. Speech: Speech to Text, Text to Speech, Speech Translation, Speaker Recognition. Language: Language Service (sentiment, entities, key phrases), Translator, Document Intelligence (forms/invoices). Decision: Content Safety, Anomaly Detector.

#### **Topic 84: Azure OpenAI Service**

Enterprise OpenAI on Azure. GPT-4o, GPT-4, GPT-3.5-Turbo, DALL-E 3, Whisper. vs OpenAI Direct: Azure = data residency, no training on your data, VNet/Private Endpoint/RBAC, compliance, Microsoft support. Provisioned Throughput: Reserved capacity for high, predictable usage. No rate limiting. RAG Pattern: User question, Search AI Search (your documents), Combine context, Generate answer.

#### **Topic 85: Azure AI Search**

Cloud search with AI. Full-text, filters, faceting, semantic search, vector search. Concepts: Index, Indexer (auto-pull from source), Skillset (AI enrichment), Semantic ranker, Vector search. Sources: Blob, SQL, Cosmos DB, Table Storage, SharePoint.

## **Topic 86: Azure IoT Hub**

Managed IoT connectivity. Millions of devices. MQTT/AMQP/HTTPS. Per-device auth. Device twins. Cloud-to-device messages. Tiers: Free (8K msgs/day), B1/S1 (400K-8M), B2/S2 (6M-120M), S3 (300M-2B). Device Provisioning Service (DPS): Zero-touch provisioning at scale. TPM, X.509, symmetric key.

## **Topic 87: Azure IoT Operations**

New edge IoT platform on Azure Arc. MQTT broker, data flows, asset management. Runs Kubernetes at the edge.

## **Topic 88: Azure Digital Twins**

Model physical environments. Twins with properties and relationships. Ingest IoT data, query model, trigger actions. Smart buildings, cities, manufacturing.

## **Topic 89: Azure Stream Analytics**

Real-time stream processing. SQL-like queries on streaming data. Input from Event Hubs/IoT Hub. Output to SQL/Power BI/Functions.

## **Topic 90: Azure Databricks**

Apache Spark analytics. Collaborative notebooks. Auto-scaling clusters. Delta Lake built-in. Integration with ADLS, Key Vault, Synapse.

## **Topic 91: Azure Machine Learning**

End-to-end ML platform. Workspace, Compute, Pipelines, Models, Endpoints, AutoML, MLflow. Deployment: Managed online endpoint (real-time), Batch endpoint (periodic), Kubernetes (AKS). Architect role: Design secure infrastructure (Private Endpoint, VNet, Key Vault, API Management), not build models.

## **Topic 92: Microsoft Purview**

Data governance and compliance. Data Map (auto-scan), Data Catalog (searchable), Classification (auto-classify), Information Protection (sensitivity labels), Audit (unified log), Compliance Manager (score against frameworks).

### **Topic 93: Defender for Cloud Regulatory Compliance**

Map regulatory controls to Azure Policy. Evaluate resources. Compliance score per framework. Supported: HIPAA/HITRUST, ISO 27001, SOC 2, PCI DSS, NIST 800-53, CIS, FedRAMP, CMMC, custom. Continuous Export to Log Analytics, Event Hub, Power BI.

### **Topic 94: Azure Service Tags**

IP prefixes for Azure services. Use in NSGs and Firewall rules. Microsoft auto-updates ranges. Key Tags: VirtualNetwork, Internet, AzureLoadBalancer, Storage, Sql, AzureKeyVault, AzureContainerRegistry, MicrosoftCloud, AzureActiveDirectory, AppService, EventHub, ServiceBus, AzureMonitor, AzureResourceManager, GuestAndHybridManagement.

### **Topic 95: Azure Resource Mover**

Move resources between regions. Replicate VMs, recreate VNets/NSGs/LBs/Public IPs. For relocating workloads.

### **Topic 96: Azure DevTest Labs**

Self-service VM environments for developers. Custom images, formulas, artifacts, policies (max VMs, allowed sizes, auto-shutdown), cost tracking, claimable VMs.

### **Topic 97: Azure App Service Environment (ASE)**

Isolated App Service in your VNet. Dedicated infrastructure. Max 100+ instances. Internal or External LB. ~\$1K-3K/month. For compliance requiring isolation or >30 instances.

### **Topic 98: Azure Red Hat OpenShift (ARO)**

Managed OpenShift. Jointly managed by Microsoft + Red Hat. Built-in registry, CI/CD, monitoring. For Red Hat shops. More expensive than AKS.

### **Topic 99: Azure Stack**

Portfolio: Azure Stack HCI (hyper-converged on your hardware, Arc managed), Azure Stack Hub (integrated system, connected/disconnected), Azure Stack Edge (ruggedized edge device, factory/retail/oil rigs).

## **Topic 100: Azure Customer Lockbox**

Control Microsoft engineer access to your data during support. Engineer requests access, you approve/deny. Time-limited, audited. Free but requires Premier/Unified support.

## **Topic 101: Azure Sovereign Clouds**

Azure Commercial (general), Azure Government (US agencies), Azure China 21Vianet (China), Azure Secret (US intelligence), Azure Top Secret (highest classification). Different endpoints, compliance, service availability.

## **Topic 102: Azure Programs, Licensing, and Support**

Agreements: EA (enterprise, 3-year), MCA (modern, pay-as-you-go), CSP (via partner/MSP). Azure Hybrid Benefit: Use existing Windows Server/SQL Server licenses with Software Assurance. Save 40-85%. Free Services: 200+ services have free tiers. 12 months free for new accounts. Always-free: App Service F1, Functions 1M executions, Cosmos DB 400 RU/s + 5GB. Support Plans: Basic (free, self-service), Developer (~\$29/mo), Standard (~\$100/mo, 24/7), Professional Direct (~\$1,000/mo), Premier/Unified (custom). Severity: Sev0 (Critical, <1hr) to Sev4 (Verbose).