Azure Functions

Scaling, Logging, and Monitoring

Agenda

- Scaling Azure Functions
- Alert Rules
- Azure Monitor
- Log Data Sources
- App Insights
- Azure Load Testing
- Demo

Azure Functions Scaling

Ways to Scale:

- **Manual Scaling:** Manually set the number of instances.
- **Rule-Based Scaling:** Scale based on metrics like CPU usage or queue length.
- **Elastic Scaling:** Automatically scales based on the number of incoming events.

Hosting Plans:

- **App Service Hosting:** Manual and Rule-Based Scaling
  - (Can’t scale app service plans automatically when they contain Function Apps)
- **Functions Premium:** Elastic Scaling

Azure Alert Rules

What they are:

Automated rules that monitor your Azure resources and trigger actions when specific conditions are met.

Example Conditions:

- **High Error Rate** - Trigger alert if more than 5% of requests return HTTP 5xx responses within 5 minutes.
- **Excessive Duration** - Trigger alert if the average function execution time exceeds 2 seconds over a 10-minute window.

Example Actions:

- **Email Notification –** Send an alert email to the DevOps team.
- **Execute Logic App –** Trigger a Logic App workflow that automatically creates a ticket in trouble ticket (e.g. Jira, ServiceNow, Azure DevOps, GitHub)

Azure Monitor

Description:

- A comprehensive monitoring platform that collects, analyzes, and responds to telemetry from Azure and on-premises environments.

Out of the Box (no LAW):

- Basic visibility into metrics and activity logs
- Per-resource views only (no cross-resource correlation)
- Limited retention
- Simple filtering, no advanced queries

Provides:

- End-to-end visibility across applications, infrastructure, and network
- Centralized data collection from multiple subscriptions and tenants
- Real-time metrics, logs, and distributed tracing
- Alerts and automated responses to system events

With Log Analytics Workspace

- Centralized log storage across subscriptions/tenants
- Advanced querying with KQL (correlate across apps/resources)
- Extended retention (months/years, configurable)
- Unlocks Insights, Workbooks, and custom dashboards

Log Data Sources

Azure Activity Logs:

Track all management operations on your Azure resources.

Platform Metrics:

Numerical values automatically collected at regular intervals for different aspects of a resource Specific metrics vary per resource type.

Azure Resource Logs

Provide insights into operations that were performed within an Azure resource.

Azure Functions: Logging Data Types

Data Type	Description	Data Collection Method	Azure Function Examples
Activity Log	Provides insight into **subscription-level events** for Azure services, including service health records and configuration changes.	Collected automatically. View in the Azure Monitor or create a diagnostic setting to send it to other destinations.	• CRUD operations on function apps • Role assignment changes • Service health alerts
Platform Metrics	Provides insight into **Function App level events.** Numerical values automatically collected at regular intervals for different aspects of a resource Specific metrics vary per resource type.	Collected automatically. View in the Azure Monitor or create a diagnostic setting to send it to other destinations.	• Function Execution Count: Total number of executions • HTTP Status Codes • Average Memory Usage • CPU Percentage • Requests per Minute (RPM)
Resource Logs	Provide insight into **function execution / instance level** operations performed within an Azure resource. Content varies by service and resource type.	You must create a diagnostic setting to collect resource logs.	• Traces: Detailed info about function executions, dependencies, and exceptions • Dependency calls: SQL queries or HTTP requests made by the function • Exception stack traces for failed function executions

Application Insights

Description:

An Azure, cloud native monitoring service that helps you detect, diagnose, and understand issues in your apps by tracking performance, availability, and usage.

What it provides:

- Visibility into request rates, response times, and failure trends
- Tracking of dependencies like databases and external APIs
- Detailed exception and error reporting
- User behavior insights (page views, sessions, usage patterns)
- End-to-end distributed tracing across services

Application Insights SDK:

Easily add custom telemetry from your application for deeper diagnostics and insights.

Azure Functions: Logging with Application Insights

Log Type	Available without App Insights	What App Insights adds on top
Activity Logs	Always available (subscription/control-plane events like create, delete, restart, role assignments)	No added value. App Insights doesn't ingest subscription Activity Logs.
Platform Metrics	Auto-collected (CPU %, memory, execution count, requests per minute, HTTP status codes).	Correlates metrics with app activity for root-cause insights. Example: a CPU spike tied to Function X or a slow SQL call, or HTTP 500 errors traced to the exact function and failing dependency. **Turns "what happened" into "why it happened."**
Resource Logs	Collectable if you configure diagnostic settings. Includes FunctionAppLogs, Traces, dependency calls, and exceptions. Can be sent to Log Analytics, Storage, or Event Hub.	Rich telemetry experience: request/response traces, dependency tracking (SQL, HTTP), exception stack traces, distributed tracing (application map, correlation IDs).

Azure Load Testing

What is Azure Load Testing?

- Generate high-scale load to simulate real-world traffic
- Supports Apache JMeter and Locust frameworks
- Quick URL-based testing or advanced script upload
- Test private endpoints and on-premises apps

Key Features

- Real-time monitoring with detailed metrics
- Azure Monitor integration for resource insights
- CI/CD integration with Azure Pipelines
- Test history and regression detection

Supported Applications & Protocols

- Web applications (HTTP/HTTPS) and REST APIs
- Databases via JDBC connections
- TCP-based endpoints and message queues

Key Benefits

- Identify performance bottlenecks early
- Automated testing in development workflows
- Pay-as-you-go pricing (virtual user hours)

No infrastructure management required - fully managed Azure service

Demo

Scaling:

- Show how to scale a function app using rule-based scaling.
- Demonstrate how to configure alert rules to trigger scaling events.

Monitoring:

- Show how to use Application Insights to monitor application performance.
- Demonstrate how to use Azure Monitor and Log Analytics to query logs.

Load Testing:

- Show how to use Azure Load Testing for simulating high-traffic scenarios and measuring application performance under stress.

Demo Architecture