THRIVE CONFERENCE

Xnet ORGANIZER

Monitoring and logging

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C# and .NET

2021 Edition

Christian Nagel

- Training
- Coaching
- Consulting
- Development

- Microsoft MVP
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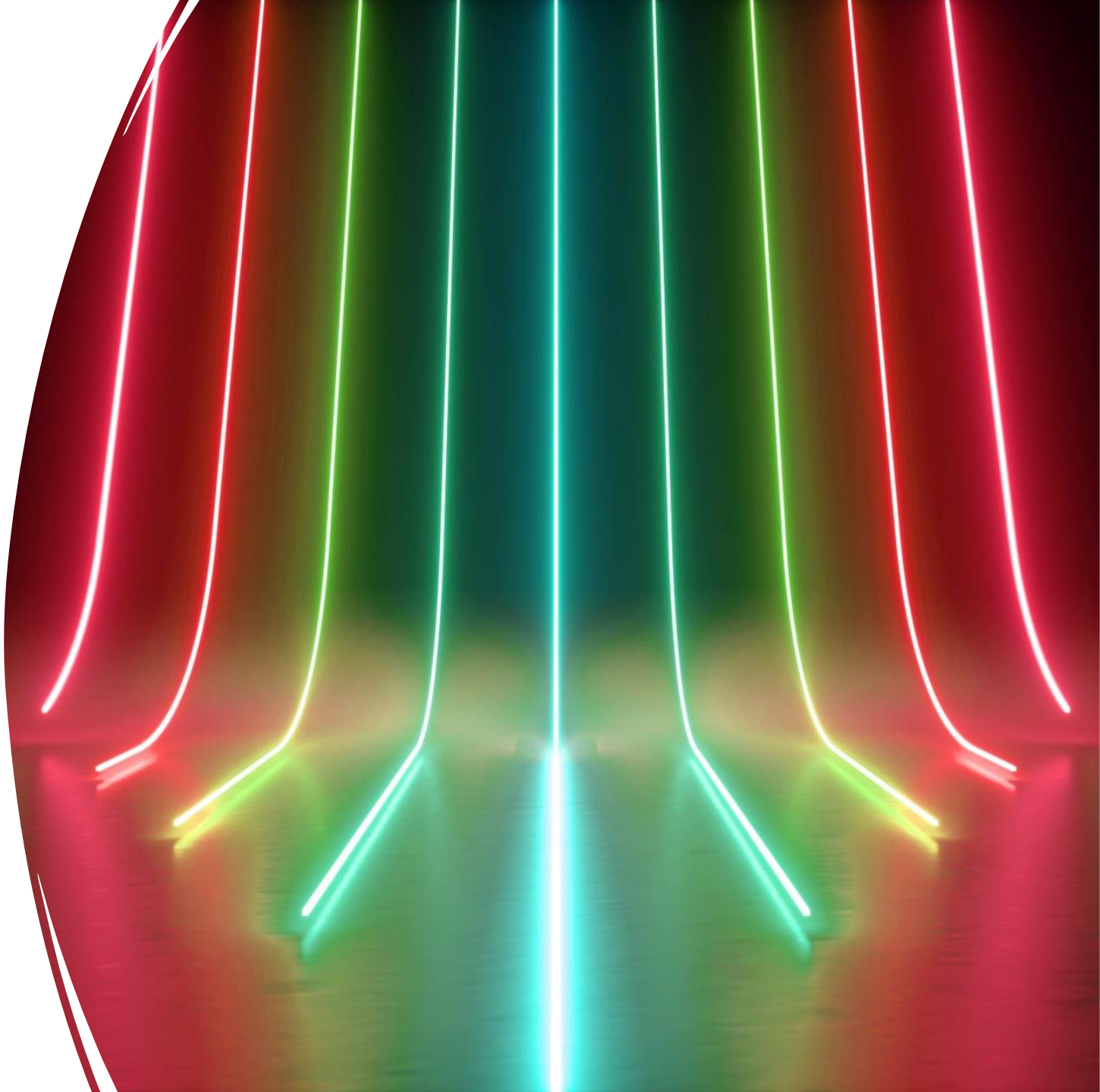
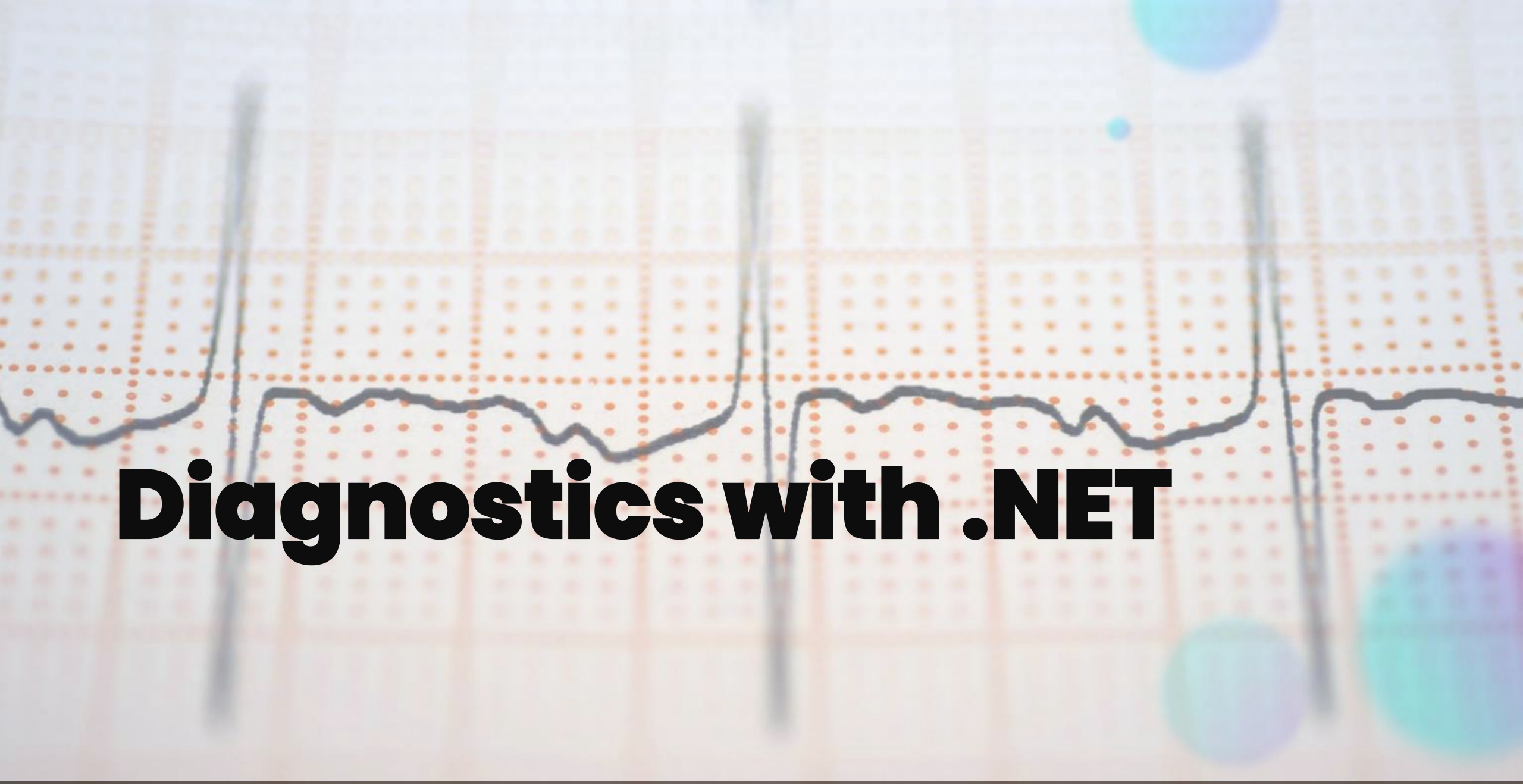
- @christiannagel

Topics

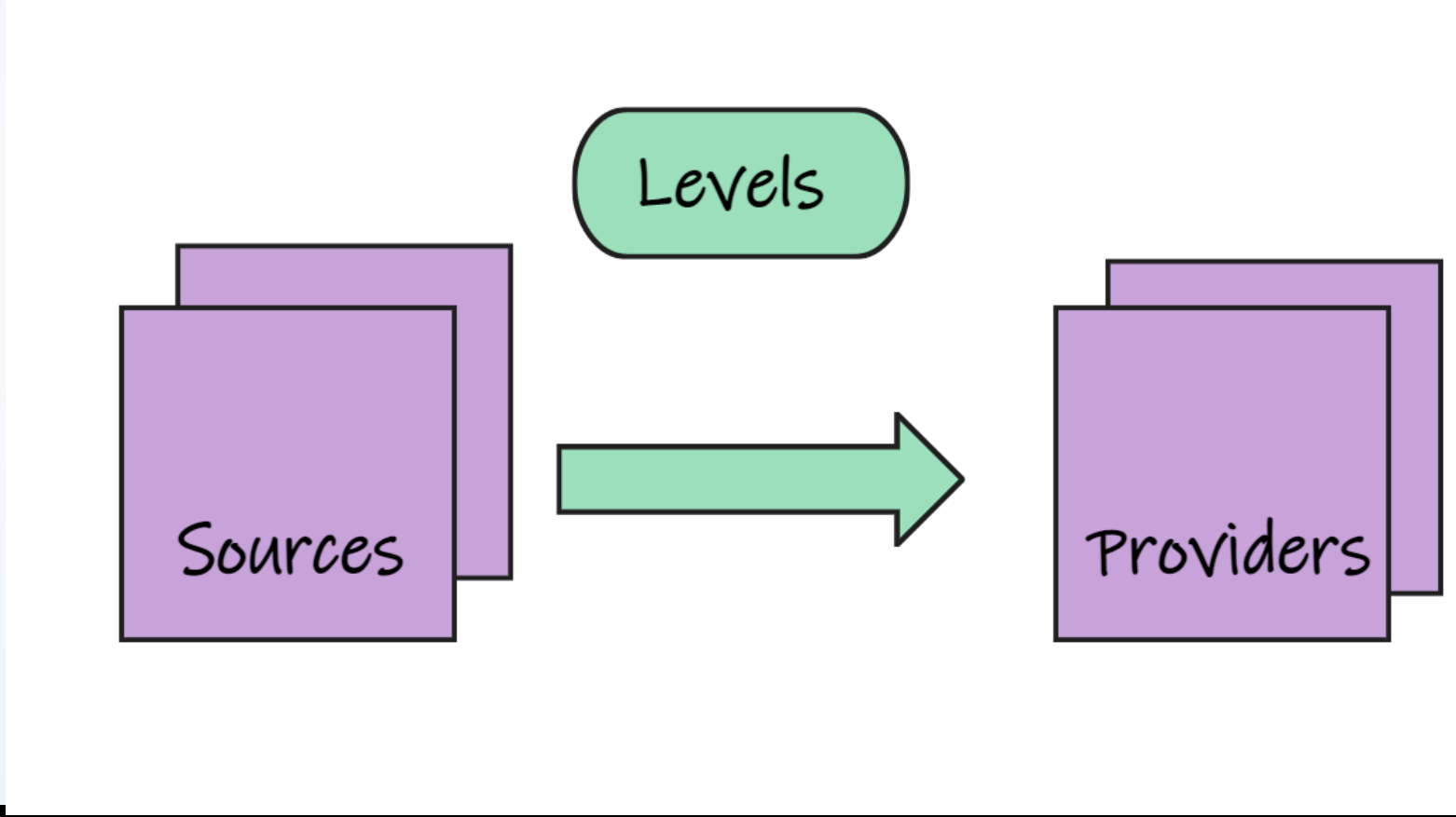
- Logging
- Metrics
- Distributed Tracing
- Azure Services





Diagnostics with .NET

Logging



Log Providers

EventLog

- Windows
- Defaults to Warning

Console

- Console, SimpleConsole, JsonConsole

Debug

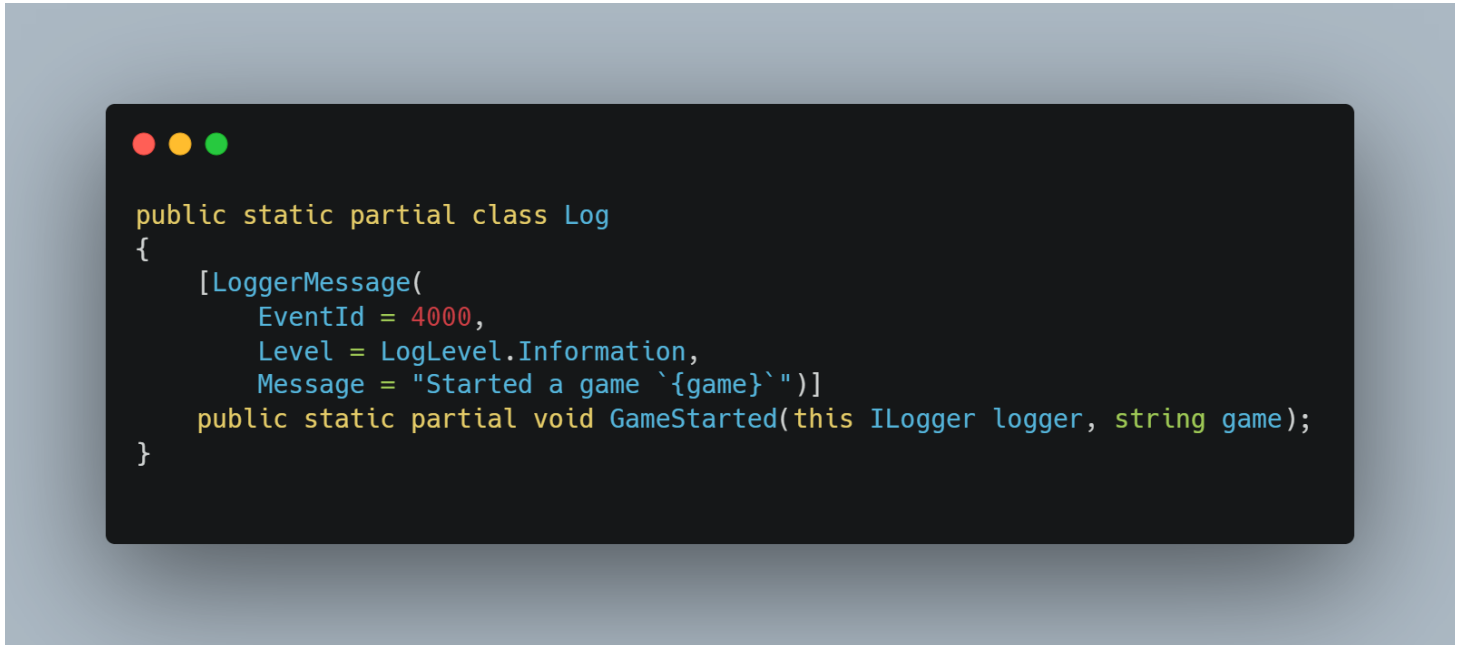
- Uses Debug class

EventSource

- Cross-platform
- Microsoft-Extensions-Logging

Logging Source Generator

- High-performance logging
- Cached delegates



```
public static partial class Log
{
    [LoggerMessage(
        EventId = 4000,
        Level = LogLevel.Information,
        Message = "Started a game `{game}`")]
    public static partial void GameStarted(this ILogger logger, string game);
}
```

Metrics

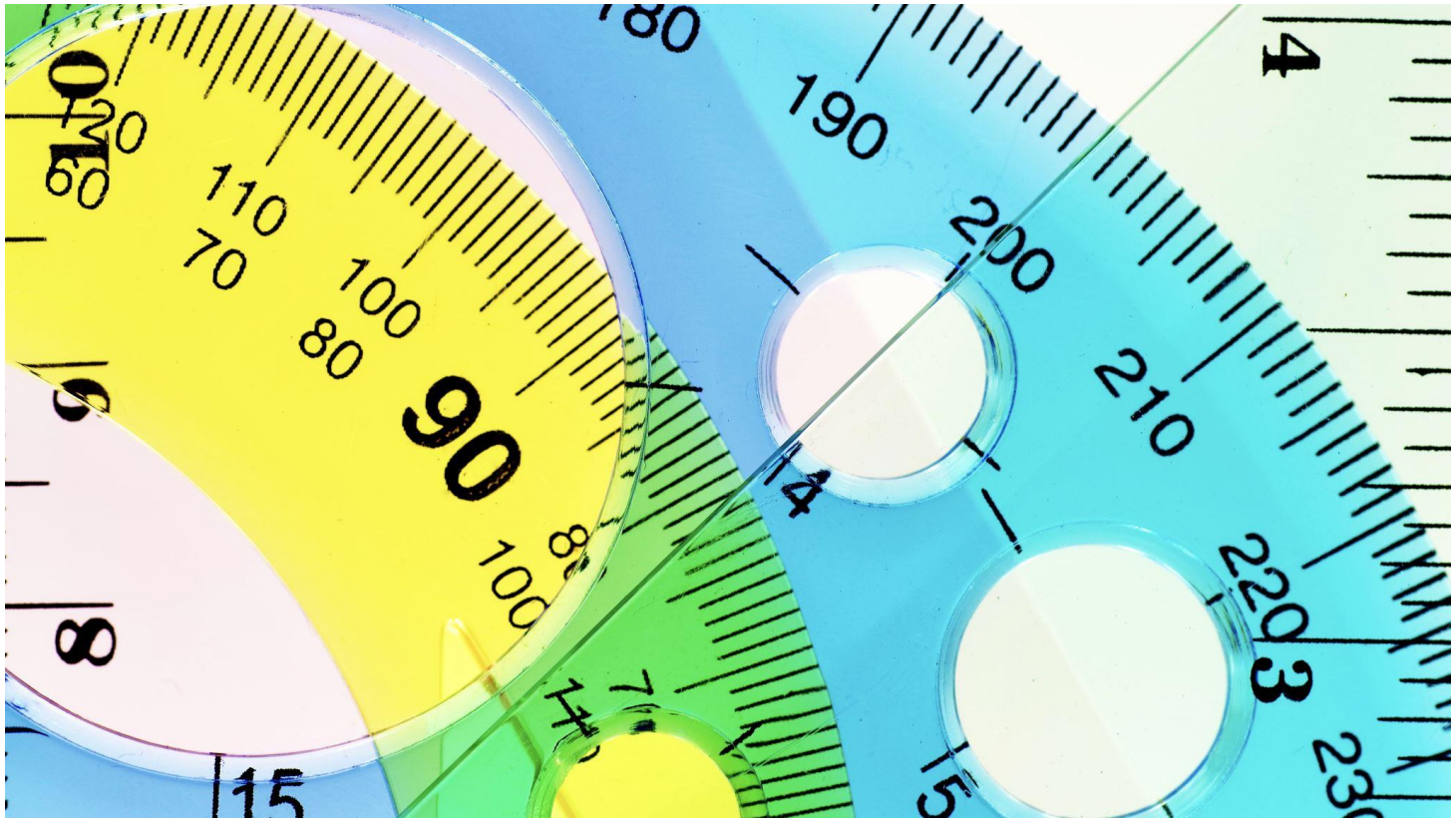
- Numerical measurements
- Traditional API
  - EventSource (System.Diagnostics.Tracing)
- New Simple API
  - System.Diagnostics.Metrics

Built-in .NET Counters

- .NET Runtime
- DI Container
- System.Net
- ASP.NET Core
- EF Core
- …

System.Diagnostics.Metrics

- Meter
  - Track instruments
- Counter
  - Requests per second or cumulative total
- Histogram
  - Arbitrary values
- UpDownCounter (7.0)
  - Change in sizes
- ObservableCounter
  - Increasing values
- ObservableGauge
  - Non-additive values



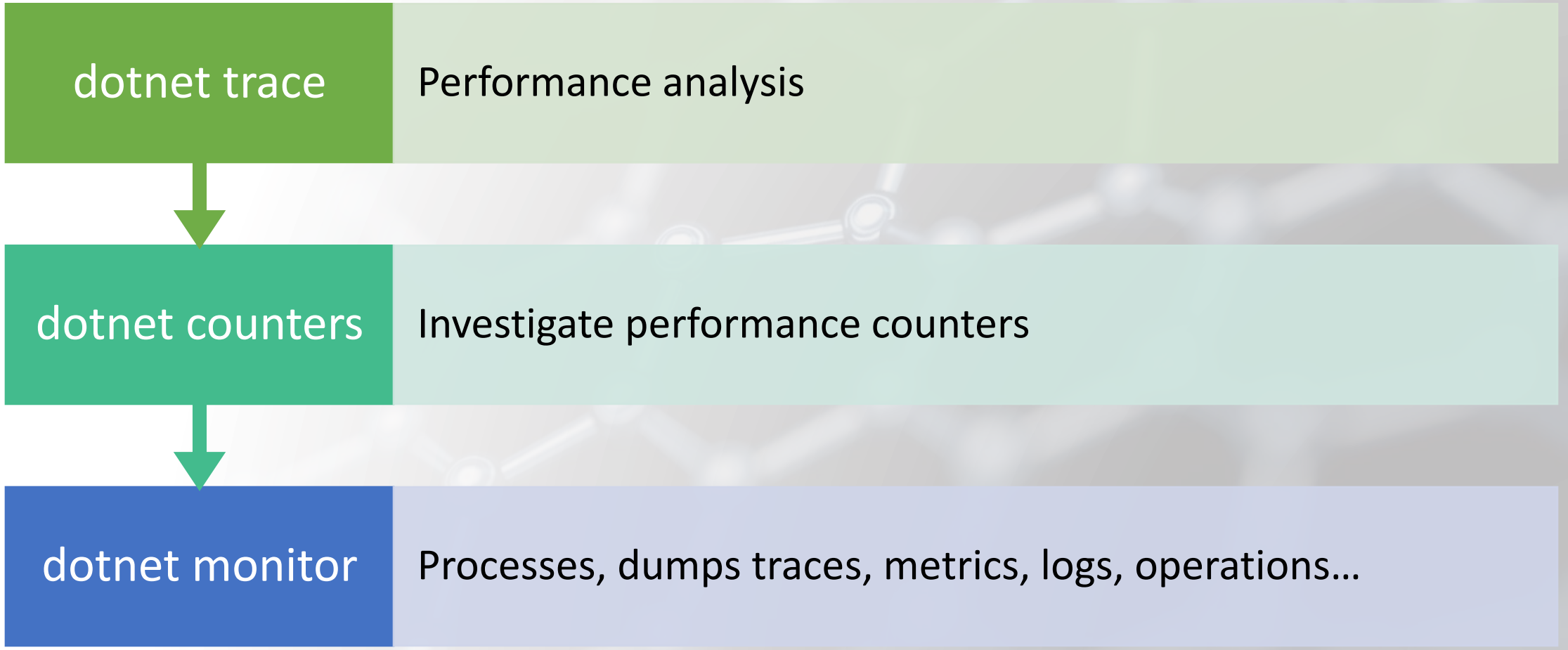
Distributed Tracing

- Tracing within applications, may be distributed across machines
- Track correlating work

.NET Activity

- Id
  - Hierarchical structure
  - separated by '.' or '_'
- Tags
  - Information logged with activity
- Baggage
  - Logged with activity and passed to child
- Events
  - Time-stamped messages (e.g. "done now")

.NET Tools


dotnet trace
Performance analysis
dotnet counters
Investigate performance counters
dotnet monitor
Processes, dumps traces, metrics, logs, operations…

OpenTelemetry

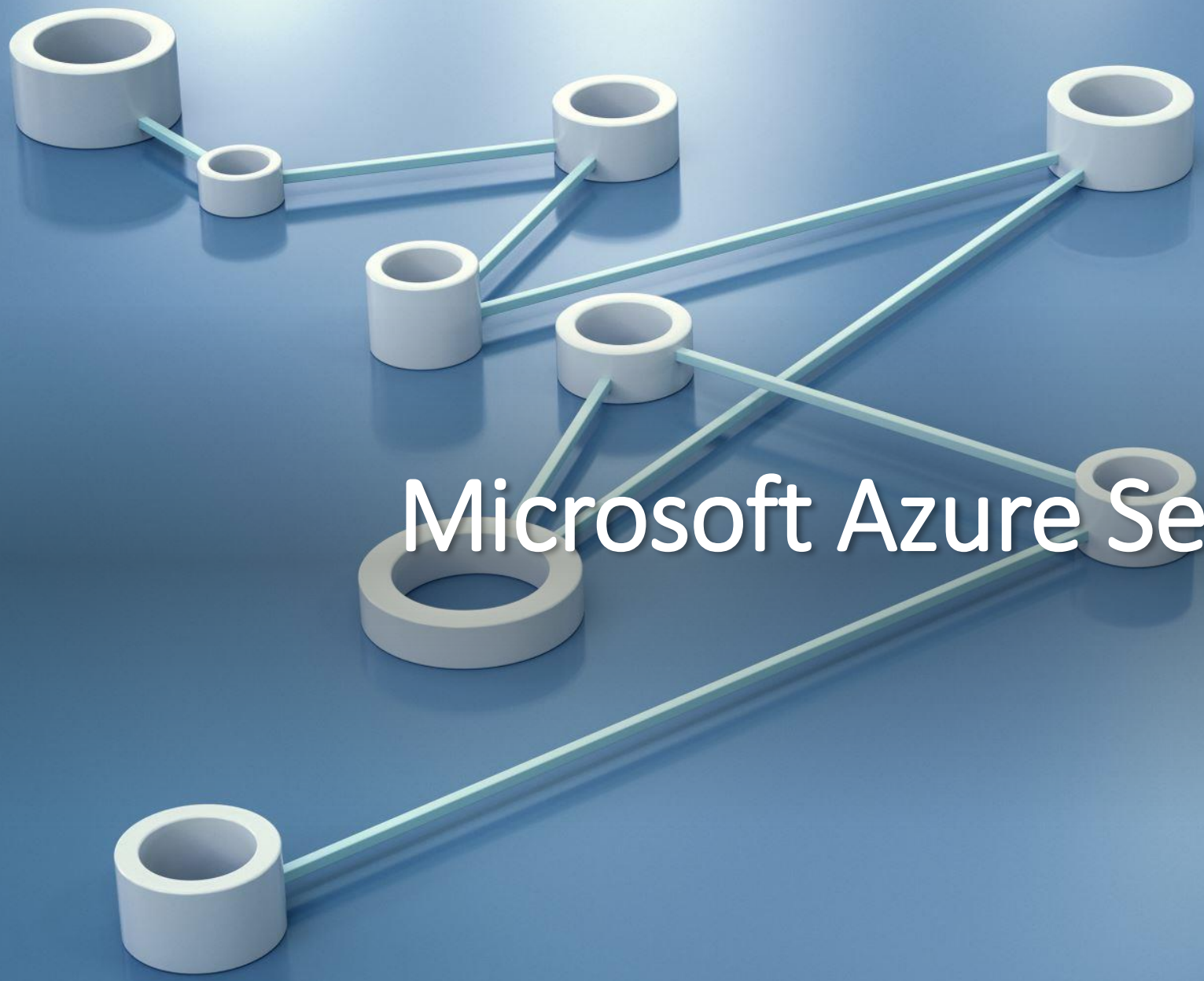
- https://opentelemetry.io
- Instrumentation
- C++, .NET, Erlang/Elixir, Go, Java, JavaScript, PHP, Python, Ruby, Rust, Swift
- Collectors
- Vendor-agnostic way to receive, process, export telemetry data

.NET

Logging

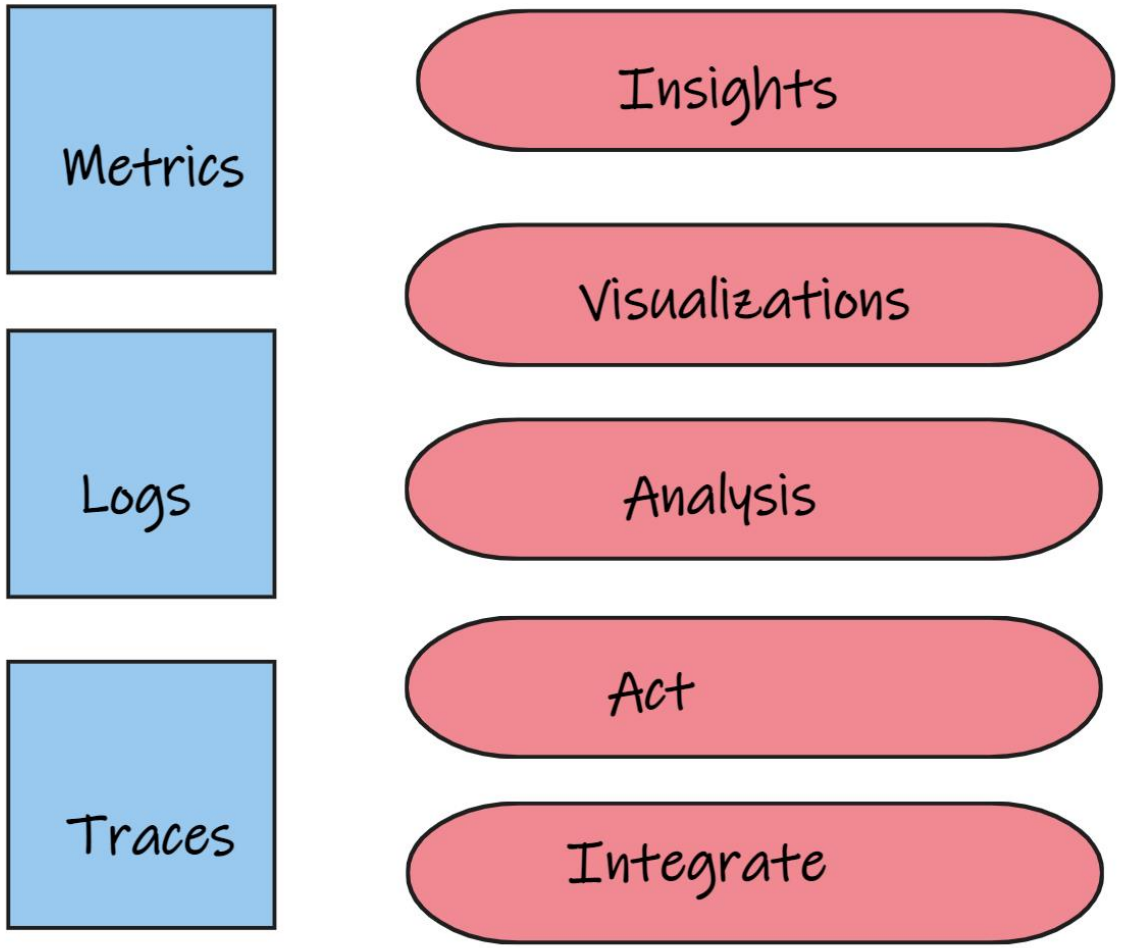
Metrics

Distributed Tracing



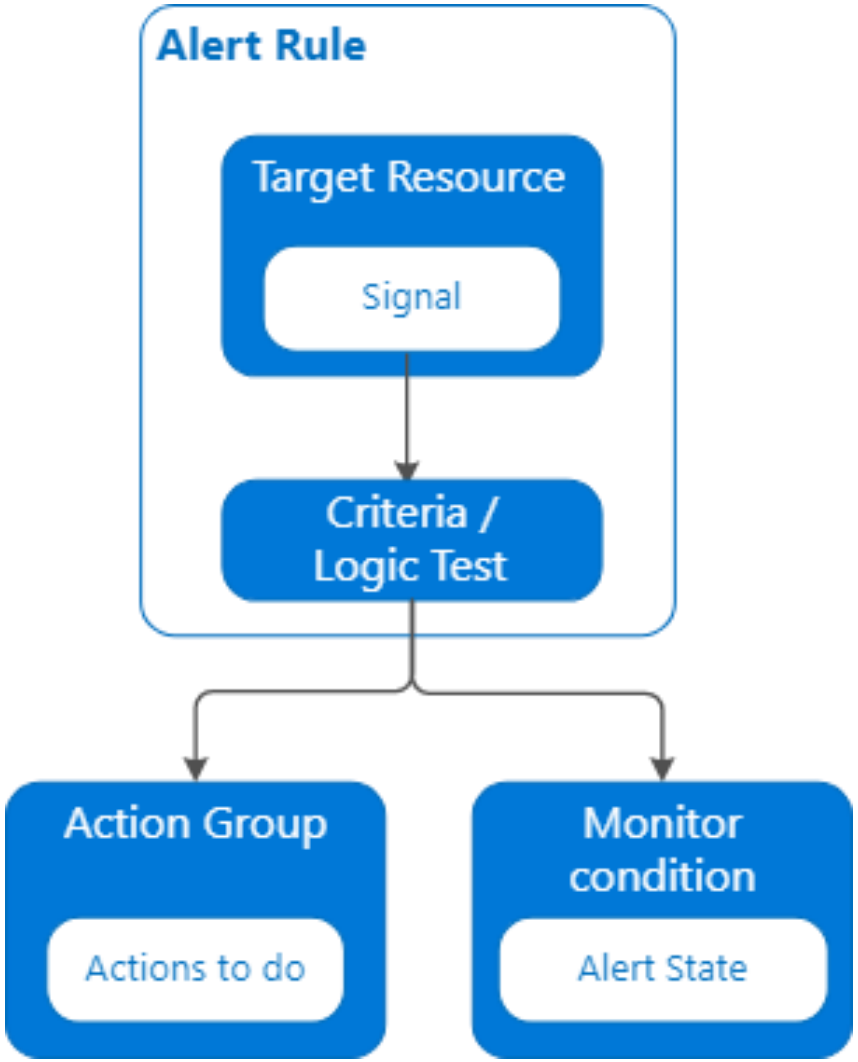
Microsoft Azure Services

Azure Monitor



Logs

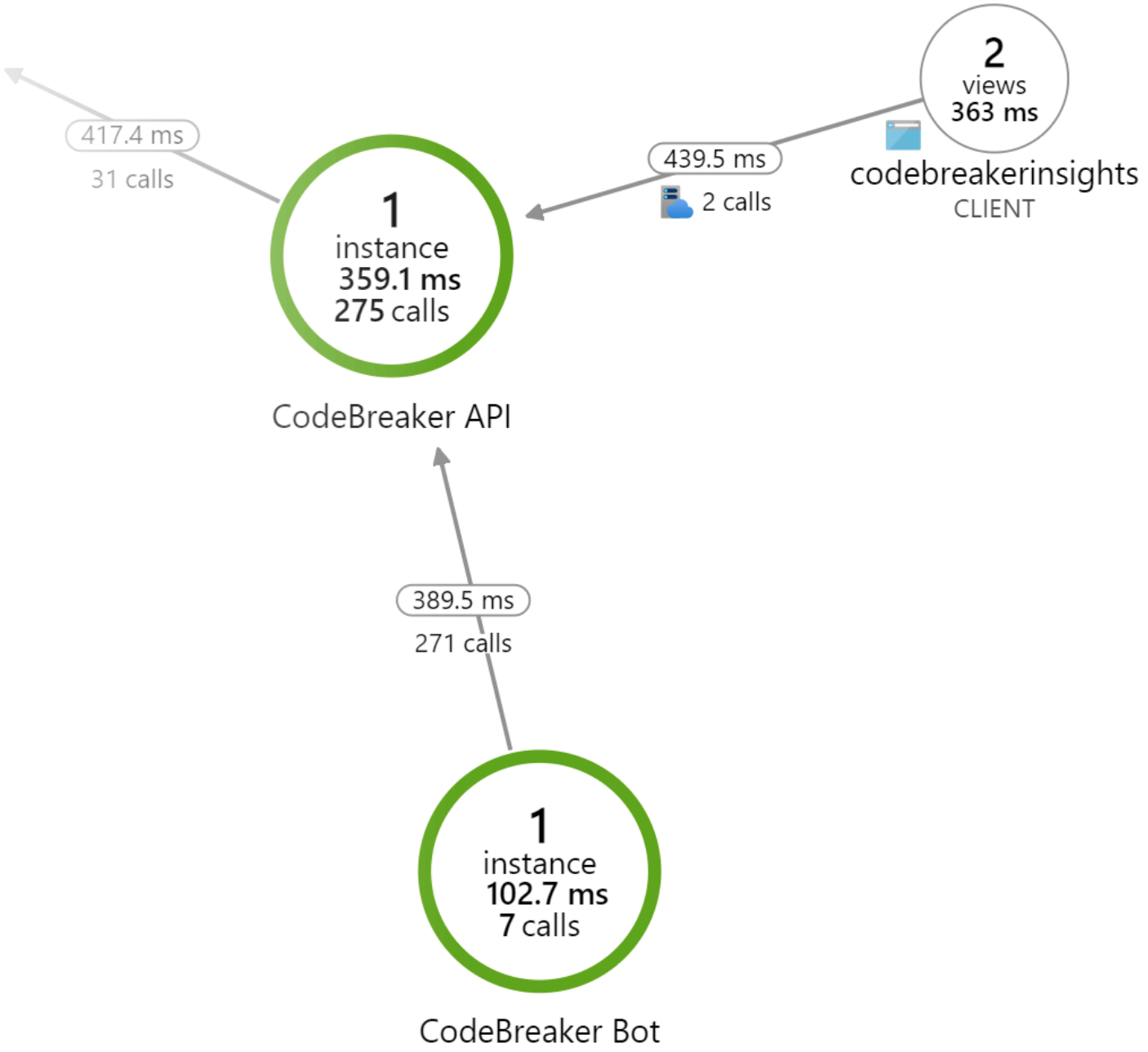
- Kusto Query Language (KQL)
- Explore data, patterns, explore anomalies
- Tabular output
- Visualize with Dashboards, PowerBI, Grafana


Alert Rule
Target Resource
Signal
Criteria / Logic Test
Action Group
Actions to do
Monitor condition
Alert State

Alerts

Application Insights

- Application Performance Management
- Live Monitoring
- Automatically detect performance anomalies
- See what users do



Take away

- Use .NET features for logging, metrics, distributed tracing
- Source code generator logging
- System.Diagnostics.Metrics API
- OpenTelemetry

- Azure Monitor
- Dashboards
- Logging
- Alerts
- Application Insights

Thank you
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