What is going on?
Application Diagnostics on Azure

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Agenda

What is going on?

Application Insights
- the service
- the developer side (SDK)

Application Insights Analytics


What is going on?

Log all the things…

```
System.Diagnostics.Trace.TraceInformation(
      "Something happened");


System.Diagnostics.Trace.TraceWarning(
      "Error! " + ex.Message);
```

…into a typical log

```
App.exe [12:13:03:985] Information: 0 : Customer address updated.
App.exe [12:13:04:011] Error: 8 : System.NullReferenceException occurred. Value
can not be null.
App.exe [12:13:04:567] Information: 0 : Machine policy value 'Debug' is 0
App.exe [12:13:04:569] Verbose: 9 : ******* RunEngine
           ******* Action:
           ******* CommandLine: **********
App.exe [12:13:04:578] Information: 9 : Entered CheckResult()
App.exe [12:13:04:689] Debug: 0 : Created. Req=0, Ret=8, Font: Req=null
```

Does this help troubleshooting? Improve the application? Analyze trends?

No.

Log files suck.

Just stupid string data

Typical log file has no “context”

Typical log file has no correlation

Log files do not measure CPU, memory, I/O, …

How to get data off our machines?

How to report/analyze?

Log files suck.

- Just stupid string data
- Typical log file has no "context"
- Typical log file has no correlation

} Semantic Logging (e.g. ETW, Serilog, …)

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How to report/analyze?

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{ Log files do not measure CPU, memory, I/O, … } Windows Server tooling, NewRelic, PRTG, SNMP, …

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How to report/analyze?

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{ How to get data off our machines? } Vendor tooling, NewRelic, PRTG, SNMP, …

How to report/analyze?

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Log files do not measure CPU, memory, I/O, …

How to get data off our machines?

{ How to report/analyze? } Splunk, LogStash, Kibana, …

Analytics suck!

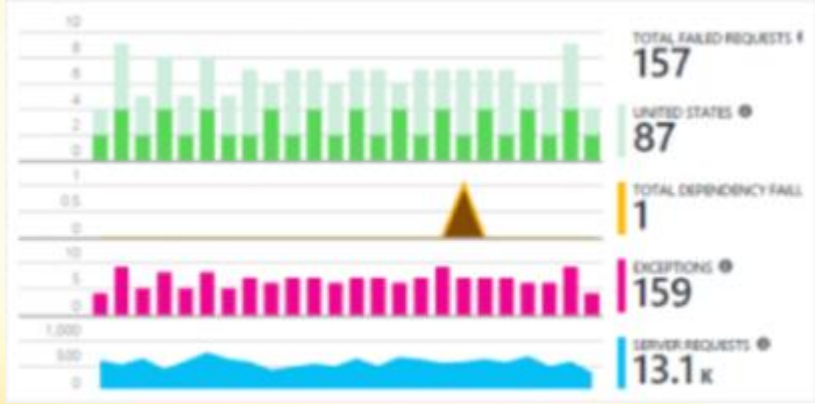
Either use vendor tooling

- What with x-plat deployments?

Either build it ourselves

- Lots of components, management overhead, …
- Plus: all we wanted was logging and correlation…

Application Insights



Application Insights

Azure Service + Library/SDK

Solves “where to store”, “how to ship”, “how to analyze”

Enriches logs with telemetry (e.g. client + server + dependency/DB/…)

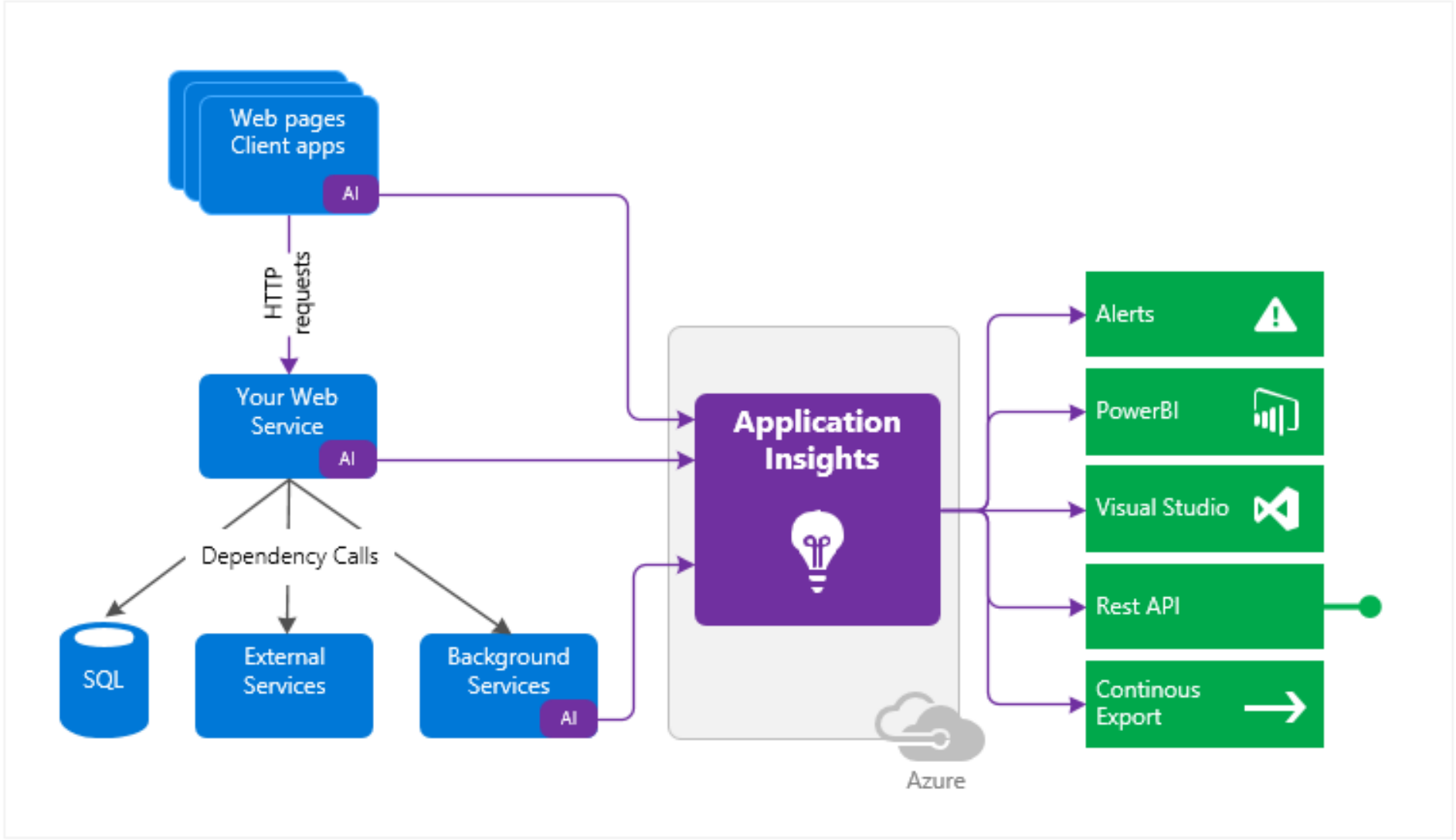
Allows structured logging

Allows rich querying, alerting

Works for many, many platforms and languages

- Web, Windows, Xamarin, any application type really
- .NET, Java, JavaScript, Objective-C, PHP, Python, Ruby, …
- Docker (host and container), VMs, …

Application Insights



Getting Started

DEMO

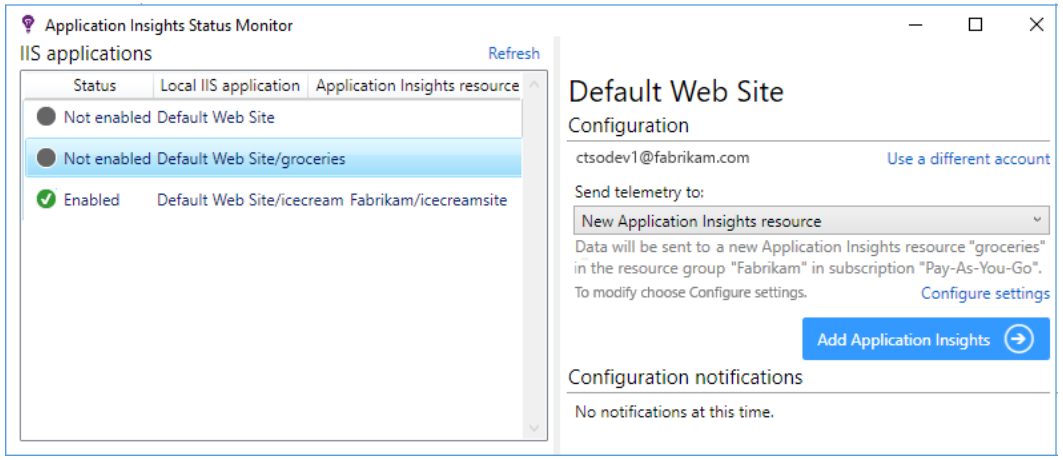
Do I *have* to run on Azure?

REST API to send data to

Various tools and SDK's to collect data specific to language/platform

https://docs.microsoft.com/en-us/azure/application-insights/app-insights-platforms

IIS

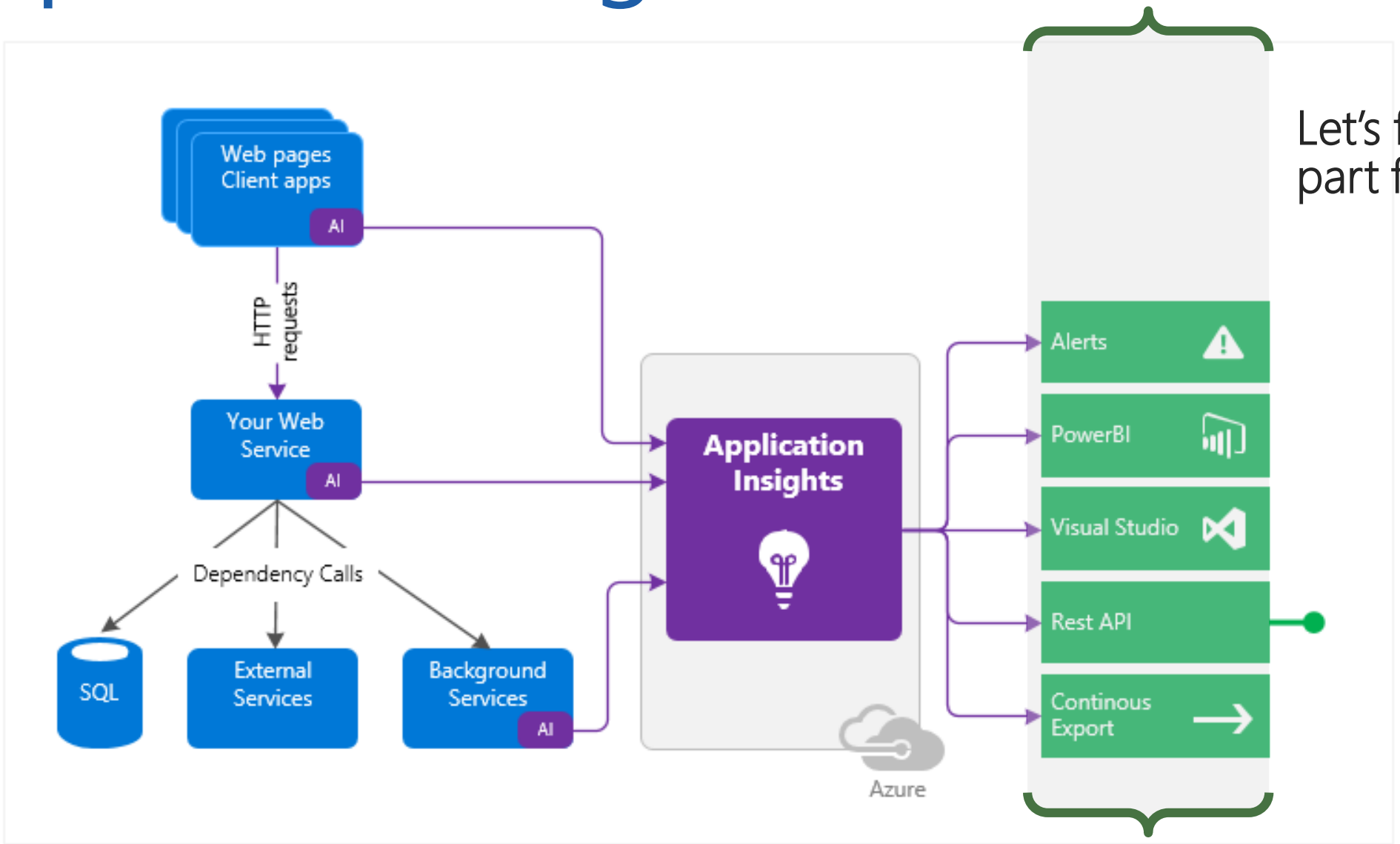


Docker host and containers

```
docker run -v
/var/run/docker.sock:/docker.sock -d
microsoft/applicationinsights
ikey=000000-1111-2222-3333-444444444
```

Application Insights – the service

Application Insights



Let's focus on this part for a bit.

Monitoring, alerting, exporting

DEMO

Input, processing, output

DATA INGESTION

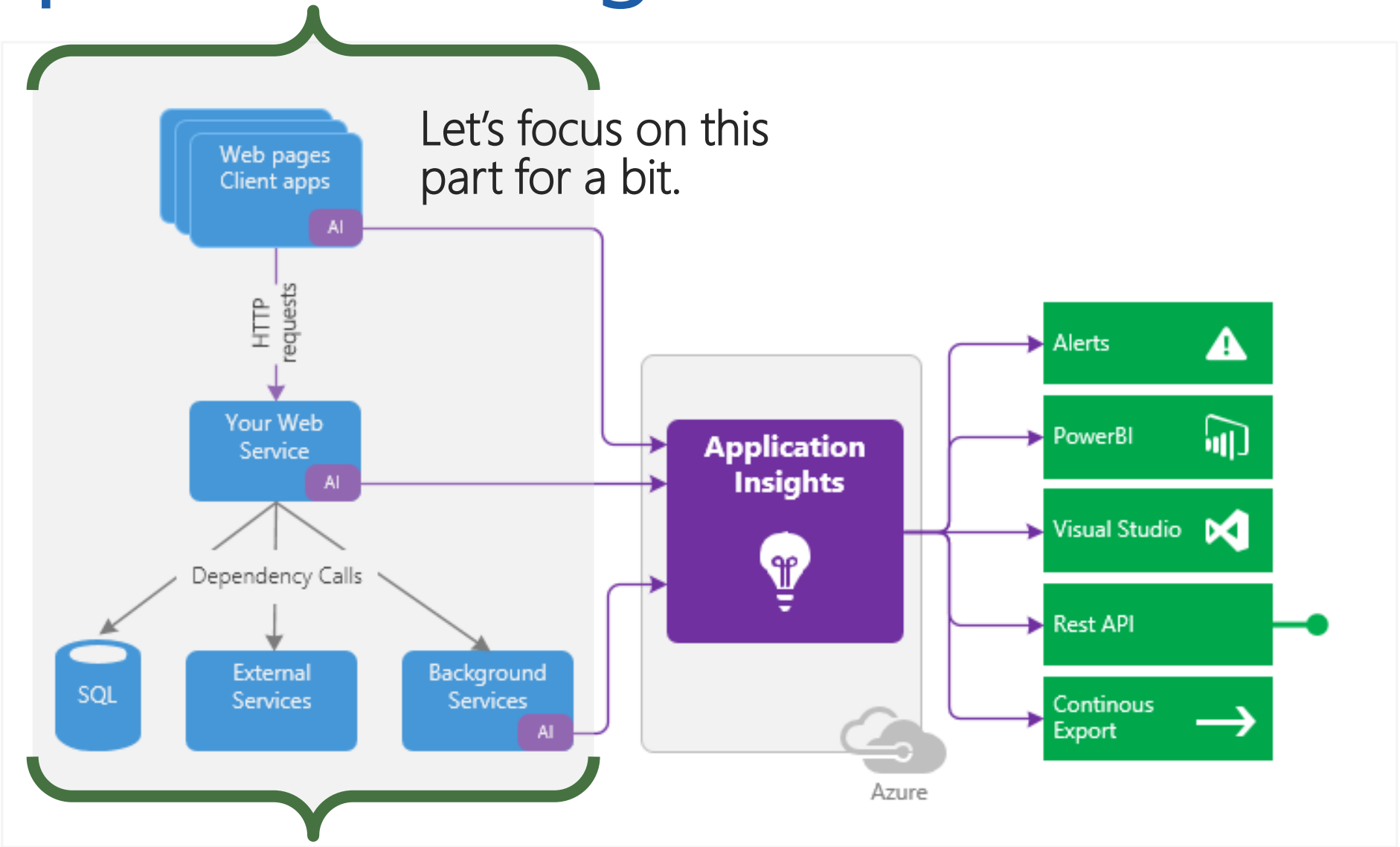
Performance Counters
Requests (both server/client side)
Traces
Exceptions
Dependencies
Custom Metrics & Events
…

CAPABILITIES

Monitoring
Alerting
Querying
Exporting

Application Insights – the developer side

Application Insights



Data being collected

AUTOMATICALLY

Performance Counters

Requests (both server/client side)

Traces

Exceptions

Dependencies

Custom Metrics & Events

…

ENRICH MANUALLY

Better tracing (semantic logging!)

Events

Metrics

Exceptions

Telemetry pipeline

…

Better tracing

Do semantic logging!

- Serilog, .NET Core logging have an Application Insights sink
- Everything else: write a sink or log directly to `TelemetryClient.Current`

Better tracing

DEMO

Events and Metrics

Send custom events and metrics
- Name of event/metric + a value

Events – help find how the application is used and can be optimized
- User resized column in a grid
- User logged in
- User clicked “Share”
- …

Metrics – help measuring quantifiable data
- # Items in shopping cart
- …

Events and Metrics

DEMO

Exceptions

Exceptions are unpleasant.

How to make them more pleasant?

- Stack traces? MiniDump?

Exceptions

DEMO

Snapshots! (MiniDump)

Snapshot collector downloads on-the-fly

- MinidumpUploader.exe
  - *separate process which monitors snapshot requests*
- SnapshotHolder_x64.exe
  - *creates a shadow process in 10-20ms, captures the minidump, returns it to MinidumpUploader.exe*

https://docs.microsoft.com/en-us/azure/application-insights/app-insights-snapshot-debugger

Enriching telemetry

Why?

- Enriching telemetry – adding properties to all data
- Obfuscating telemetry – GDPR, sensitive data, …

How?

- Directly adding data on `TelemetryClient.Current`
- Using the telemetry pipeline (middlewares on sending data to AI service)
  https://blog.maartenballiauw.be/post/2017/01/31/application-insights-telemetry-processors.html

Enriching telemetry

DEMO


Application Insights
Logs

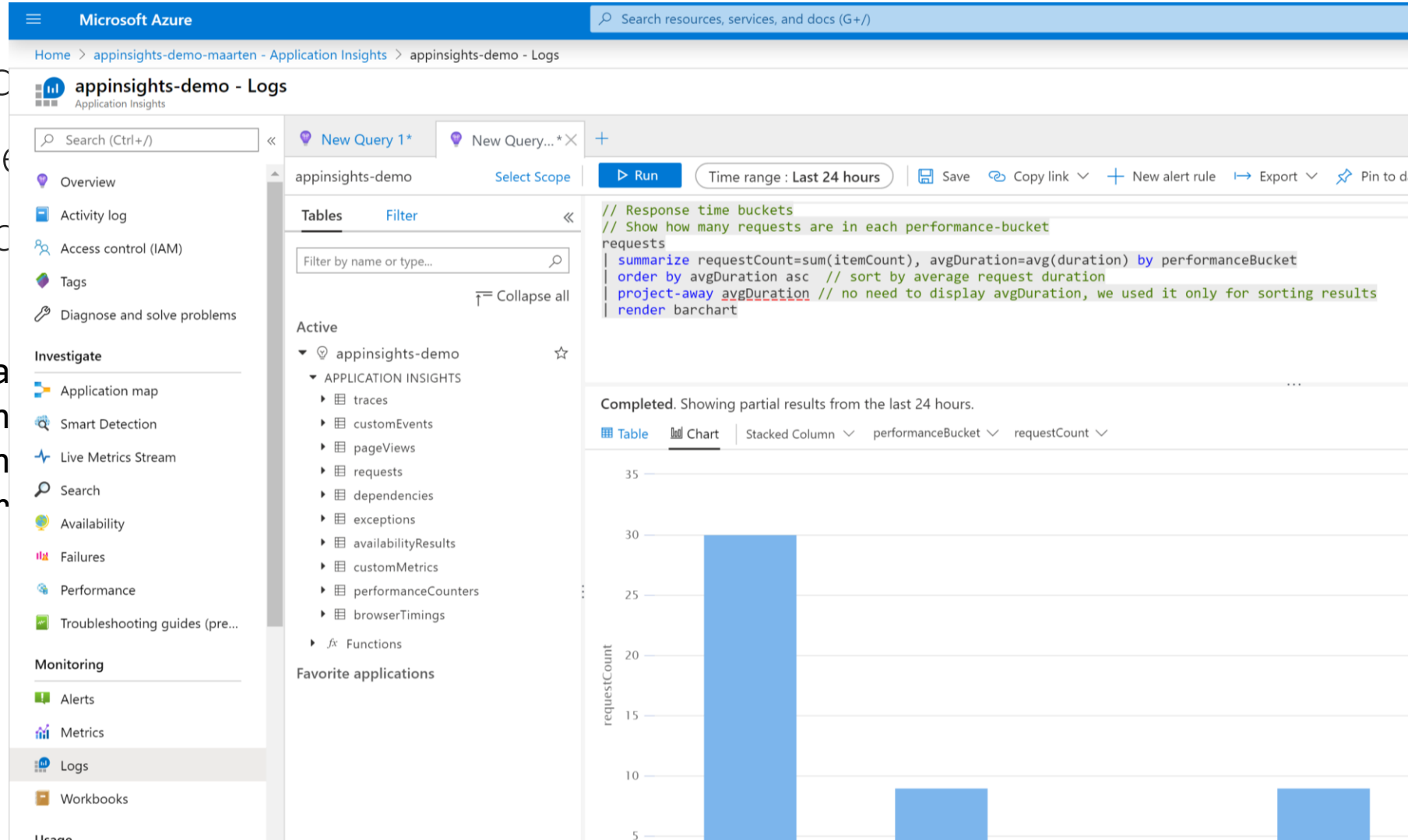
Application Insights Logs

Former MS-internal to

Near-realtime log inge

Lets you run custom q

```
requests
    | where  timesta
    | summarize coun
    | top 10 by coun
    | render piechar
```



Queries over logs!

https://docs.microsoft.com/en-us/azure/application-insights/app-insights-analytics-reference

Input dataset

- traces
- customEvents
- pageViews
- requests
- dependencies
- exceptions
- availabilityResults
- customMetrics
- performanceCounters
- browserTimings

Operators

- where
- count
- project
- join
- limit
- order

Renderer

- table
- chart (bar, pie, time, area, scatter)

Smart Detection

Uses Application Insights data and searches for trends and anomalies

- Potential memleaks – memory increase
- Increase in specific exceptions
- Abnormal rise in failed requests
- …

Each detection comes with a query!

Application Insights Logs

DEMO

What else is there?

Other client types (mobile, Java, …)

Sampling our data (in portal)

- Do we need *all* data? Or just data that is representative enough?

Release annotations

- Show a marker in the timeline when a release happens
- https://docs.microsoft.com/en-us/azure/application-insights/app-insights-annotations

Profiler

- Similar to the debug snapshots, only when performance events happen
- https://docs.microsoft.com/en-us/azure/application-insights/app-insights-profiler


Conclusion

Conclusion

Logging sucks

Application Insights

- the service – collect and ingest, analyze, different views
- the developer side (SDK) – enrich, customize, …
- rich querying over all data, automated insights/smart detection

Thank you!

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