

Performance Tuning Azure SQL Database

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User Group Leader: Hampton Roads VA

Data Saturday VA Beach Organizer



Your Barista For SQL Knowledge!



She, Her



/sqlspresso



@SQLEspresso



SQLEspresso

SQLEspresso.com

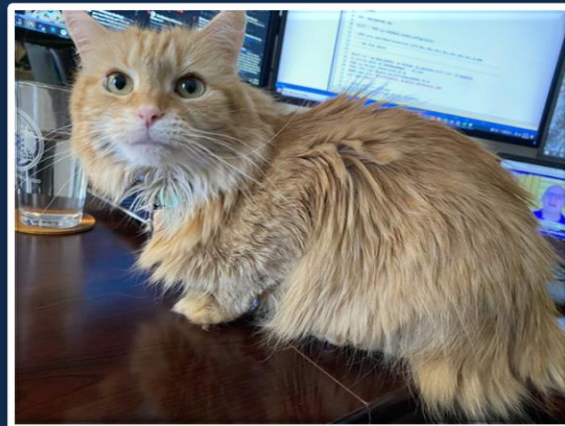


TODAY'S SPECIAL GUESTS

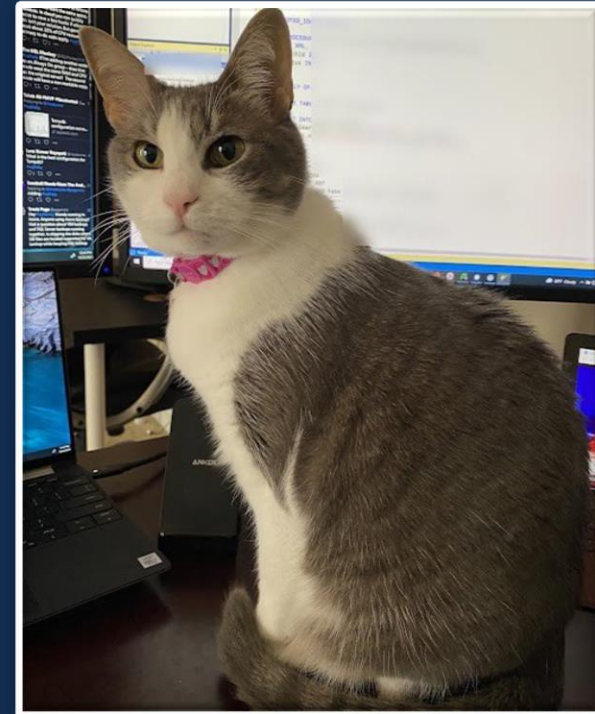
Katie



Kora



Piper





Presentation Rules

Always Ask Questions

Interrupt me

This is a two-way conversation
let's learn from each other's
experiences

AGENDA



01

WHAT IS IT

02

MONITOR

03

IDENTIFY
QUERIES

04

ANALYZE

05

READABLE
SECONDARY

06

AUTOMATIC
TUNING

IF TIME ALLOWS

DEMOS

**MOST DATABASE
MANAGEMENT IS HANDLED
WITHOUT DBA INVOLVEMENT**

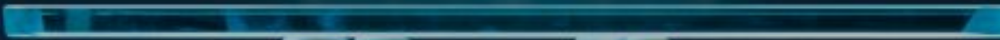
**SOME AUTOMATIC
TUNING**



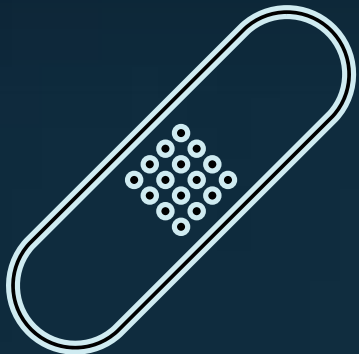
WHAT IS AZURE SQL DATABASE

**RUNS ON AZURE
COMPUTING PLATFORM**

FULLY MANAGED



TUNING, MONITORING AND MAINTENANCE IS STILL NEEDED !!!!





TUNING COMPONENTS

Azure offers several included components to performance tune your workload and database within the portal

GET THE WHOLE PICTURE



Azure Metrics

Monitoring,
Dashboarding



Query Performance Insights

Query
Identification



Azure SQL Analytics

Analyze SQL
Performance
Stats



MONITOR

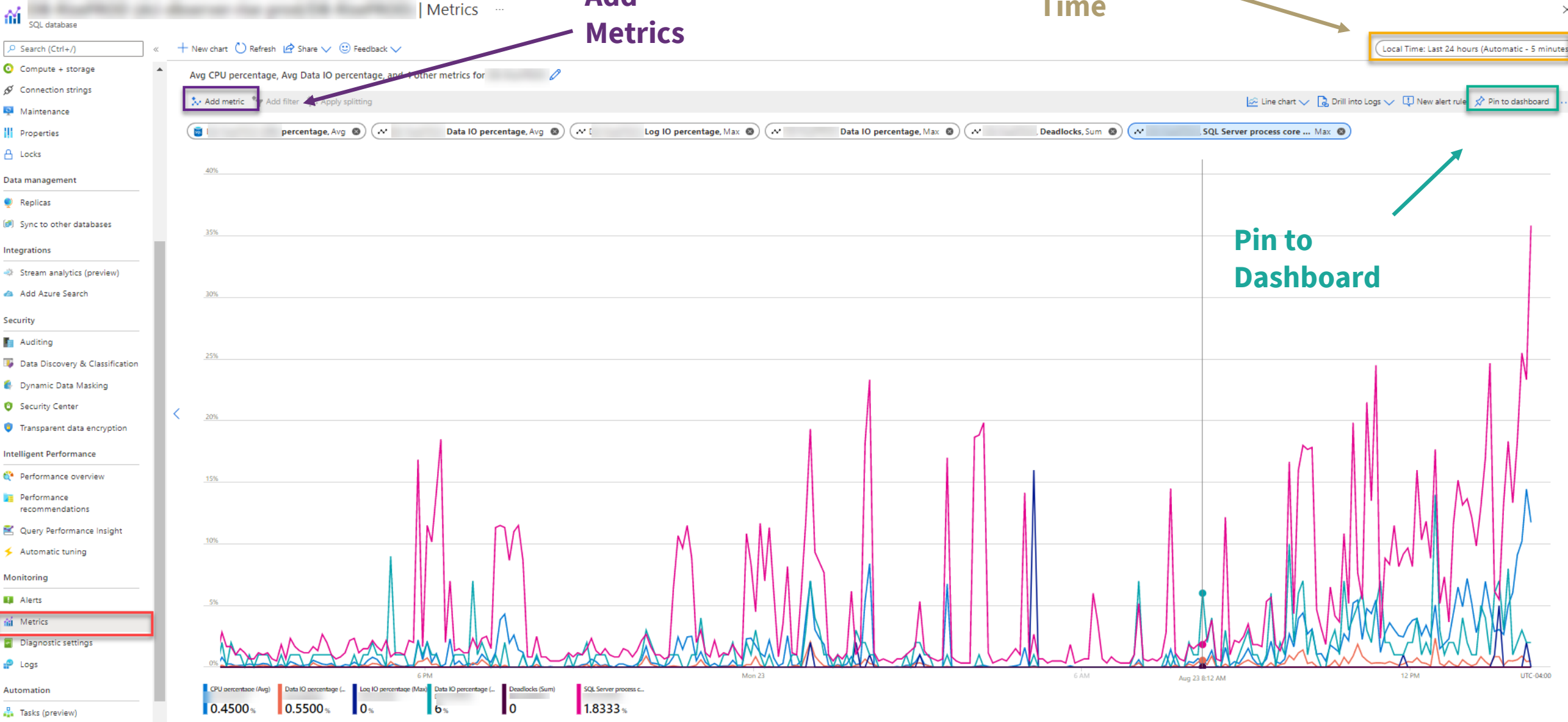
Before we can tune you need to
know your workload to identify
performance issues

METRICS

45 days 

Control Time

Add Metrics





QUERY STORE

Understanding where the insights
come from



WHAT IS QUERY STORE

Execution Plan History

Runtime Statistics

Regression Over Time

(hours, day, week, etc)

Top Resource Consumption

Wait Stats

QUERY PERFORMANCE INSIGHTS



SQL database

Search (Ctrl+J)

Compute + storage

Connection strings

Maintenance

Properties

Locks

Data management

Replicas

Sync to other databases

Integrations

Stream analytics (preview)

Add Azure Search

Security

Auditing

Data Discovery & Classification

Dynamic Data Masking

Security Center

Transparent data encryption

Intelligent Performance

Performance overview

Performance recommendations

Query Performance Insight

Automatic tuning

Monitoring

Alerts

Metrics

Diagnostic settings

Logs

Automation

Query Performance Insight

Reset settings Refresh Recommendations Getting started Feedback

Improve your database performance. View Database Advisor recommendations.

Resource consuming queries Long running queries Custom

TOP 5 queries by: CPU Data IO Log IO Query aggregation: SUM Time period: LAST 24 HRS Metrics aggregation: AVG Customize

18%
16%
14%
12%
10%
8%
6%
4%
2%
0%

18%
16%
14%
12%
10%
8%
6%
4%
2%
0%

6 PMAug 236 AM12 PM

OVERALL DTU 4.1%

CPU 3.88%
DATA IO 0.04%
LOG IO 0.3%

Click on a row below to get the details for the selected query.

QUERY ID	CPU[%]	DATA IO[%]	LOG IO[%]	DURATION[hh:mm:ss]	EXECUTIONS COUNT
20649733	1.28	0	0	01:33:23.780	170
19023326	0.35	0	0	00:44:23.800	436
19027382	0.12	0	0	00:07:44.400	79
19019963	0.09	0	0	00:07:04.760	960
19537085	0.08	0	0	00:10:29.970	8957

QUERY DETAILS



Query details

Query ID 20649733

Settings Refresh Recommendations Query Text

Query ID 20649733:

```
1  (@P1 int,@P2 int,@P3 nvarchar(38),@P4 int,@P1004 int,@P1003 int,@P1002 int,@P1001 int,
@P1000 int,@P999 int,@P998 int,@P997 int,@P996 int,@P995 int,@P994 int,@P993 int,@P992
int,@P991 int,@P990 int,@P989 int,@P988 int,@P987 int,@P986 int,@P985 int,@P984 int,
@P983 int,@P982 int,@P981 int,@P980 int,@P979 int,@P978 int,@P977 int,@P976 int,@P975
int,@P974 int,@P973 int,@P972 int,@P971 int,@P970 int,@P969 int,@P968 int,@P967 int,
@P966 int,@P965 int,@P964 int,@P963 int,@P962 int,@P961 int,@P960 int,@P959 int,@P958
int,@P957 int,@P956 int,@P955 int,@P954 int,@P953 int,@P952 int,@P951 int,@P950 int,
@P949 int,@P948 int,@P947 int,@P946 int,@P945 int,@P944 int,@P943 int,@P942 int,@P941
int,@P940 int,@P939 int,@P938 int,@P937 int,@P936 int,@P935 int,@P934 int,@P933 int,
@P932 int,@P931 int,@P930 int,@P929 int,@P928 int,@P927 int,@P926 int,@P925 int,@P924
```

Details of Query ID 20649733 (Query aggregation: sum) Last 24 hrs

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

CPU FOR 20649733 1.28 %
DATA IO FOR 20649733 0 %
LOG IO FOR 20649733 0 %

DURATION FOR 2064... 3.74 mins
EXECUTION COUNT F... 6.8

50mins
40mins
30mins
20mins
10mins
0mins

100
80
60
40
20
0

6 PM
Aug 23
6 AM
12 PM

INTERVAL	CPU[%]	DATA IO[...]	LOG IO[%]	DURATION[hh:mm:ss]	EXECUTIONS C...
8/22: 2 PM - 3 PM	0	0	0		0
8/22: 3 PM - 4 PM	0	0	0		0
8/22: 4 PM - 5 PM	0	0	0		0
8/22: 5 PM - 6 PM	0	0	0		0
8/22: 6 PM - 7 PM	0	0	0		0
8/22: 7 PM - 8 PM	0	0	0		0
8/22: 8 PM - 9 PM	16.06	0.03	0	00:46:37.0	85
8/22: 9 PM - 10 PM	0	0	0		0

Note the Query ID
this links directing
to Query Store

See RunTime Stats
per hour

Pay Attention to
CPU/Data IO

Execution Counts
can be HUGE
indicator of death
by 1000 cuts

AZURE SQL ANALYTICS

NOT GA YET (Public Preview)



What is it?

Relies on Log Analytics,
Storage Acct or Event Hub

Extra Cost

Query with Kusto Query
Language KQL

Multiple database can write to
one LA Workspace

log

☒ SQLInsights

☒ AutomaticTuning

☒ QueryStoreRuntimeStatistics

☒ QueryStoreWaitStatistics

☒ Errors

☒ DatabaseWaitStatistics

☒ Timeouts

☒ Blocks

☒ Deadlocks



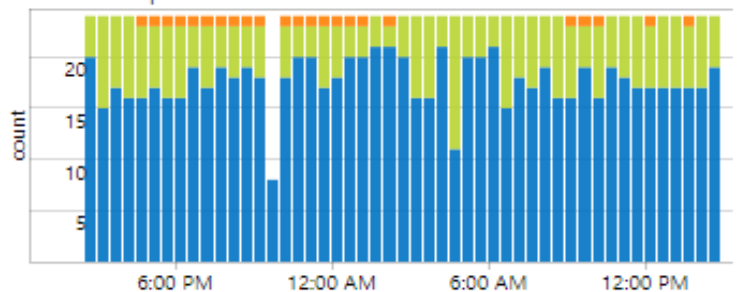
ANALYZE

See your workload in terminals of analytics over time including things like deadlocks and blocking

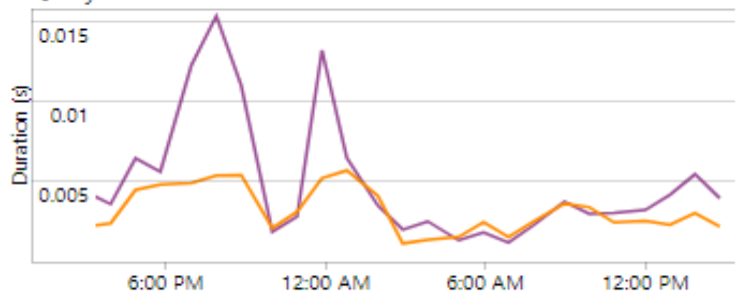
AZURE SQL ANALYTICS

DATABASE FLEET OVERVIEW

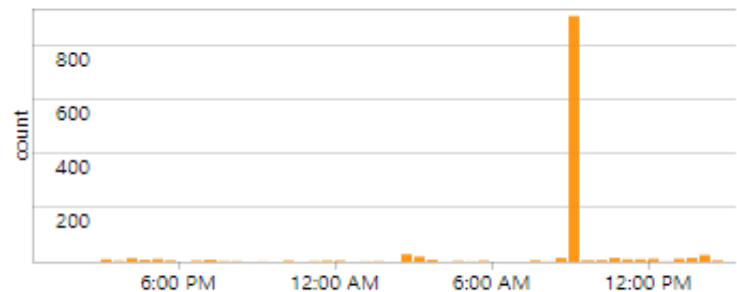
Resources per utilization bucket



Query duration in seconds

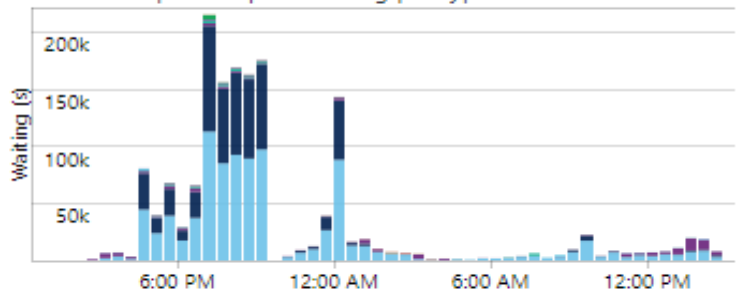


Number of errors

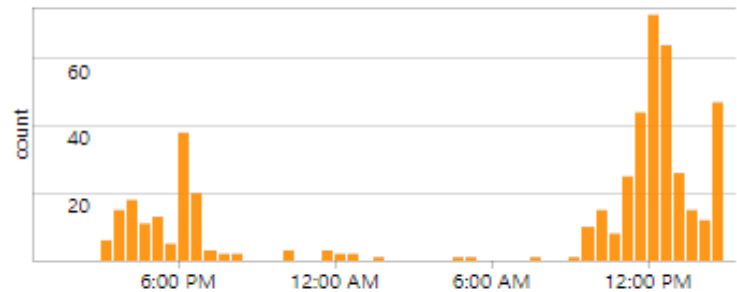


There are no **SQLInsights** issues detected for your resources.
[Learn more about SQL Diagnostics logs](#)

Total time queries spent waiting per type



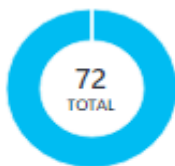
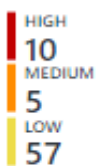
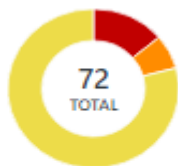
Number of timeouts



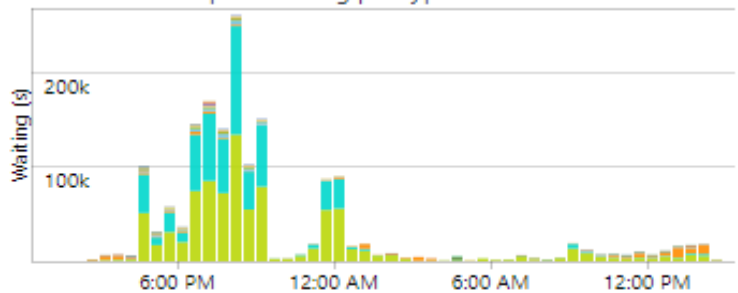
Automatic tuning recommendations

Estimated impact

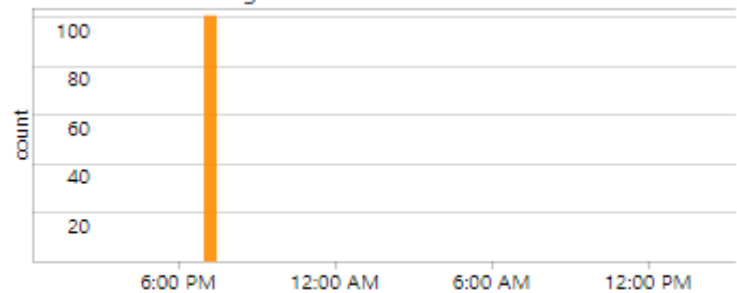
Status of auto applied



Total time DBs spent waiting per type



Number of blocking events





READ ONLY REPLICAS

Things to watch out for when you offload your workload and need to performance tune.

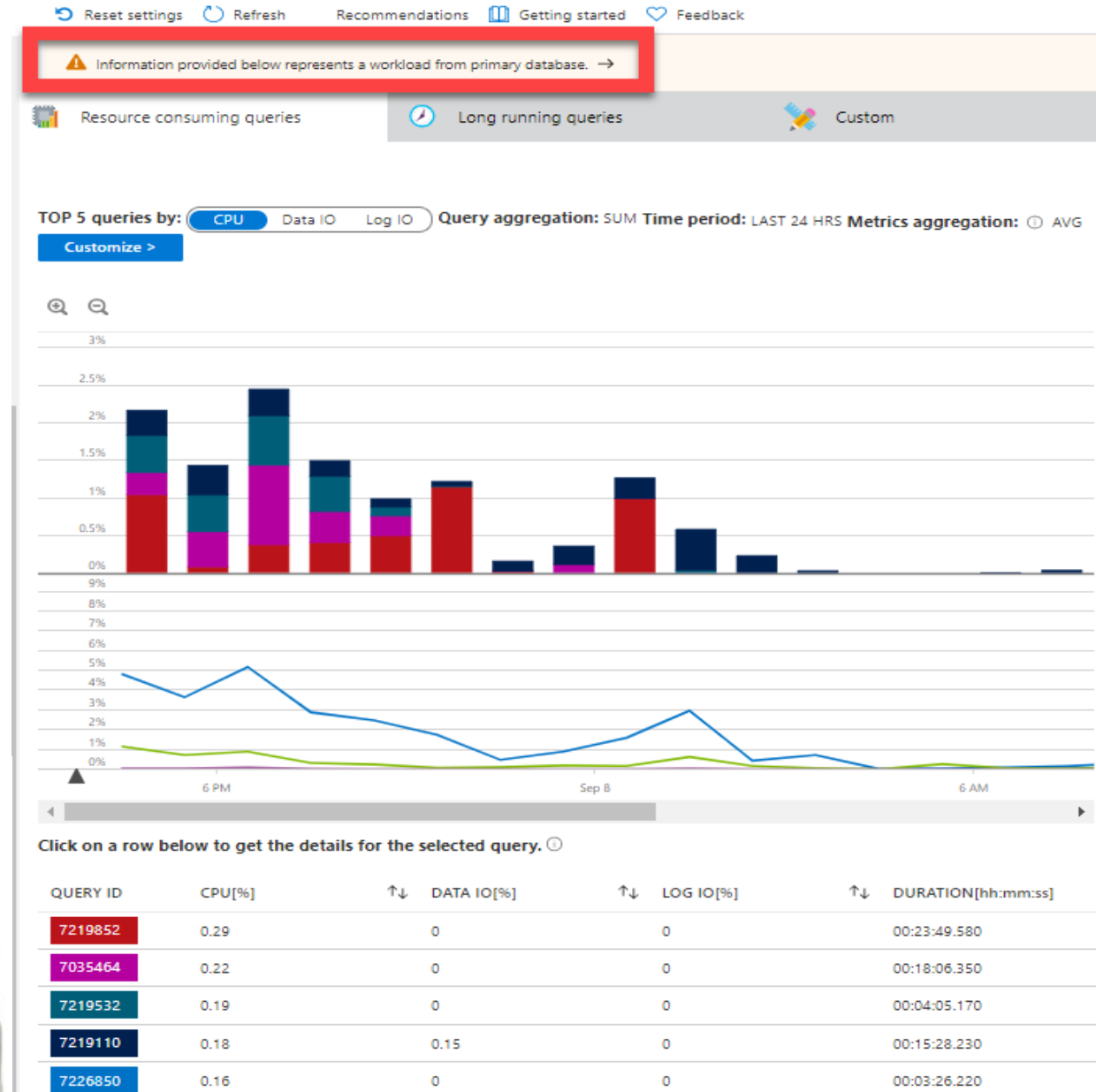
QUERY STORE IS REPLICATED



Data is
Primary
Workload

This is of
NO USE TO YOU!

Sad, I
know



SQL SERVER 2022 TO THE RESCUE









AUTOMATIC TUNING

For lazy database administrators,
like me, Automatic Tuning can be
an easy win.

AUTOMATIC TUNING

Intelligent Performance

-  Performance overview
-  Performance recommendations
-  Query Performance Insight
-  Automatic tuning

Continuously monitors query

Remains in the portal for 24-48 hours

Roll back mechanisms

Implements Indexes & Automatically forces plan corrections

Inherit from: ⓘ

Server Azure defaults Don't inherit


i The database is inheriting automatic tuning configuration from the server. You can set the configuration to be inherited by going to: [Server tuning settings](#)


Configure the automatic tuning options ⓘ


Option		Desired state		Current state
	FORCE PLAN	ON	OFF INHERIT	ON Inherited from server
	CREATE INDEX	ON	OFF INHERIT	OFF Inherited from server
	DROP INDEX	ON	OFF INHERIT	OFF Inherited from server


PERFORMANCE RECOMMENDATIONS

Intelligent Performance







 Performance overview

 Performance recommendations

 Query Performance Insight

 Automatic tuning

Tuning history

Action	↑↓	Recommendation description	↑↓	Status	↑↓	Time	↑
 Drop index Initiated by: System		Index name: IX_Person_LastName_FirstName_MiddleName_Demo1 Reason: Duplicate index		✓ Validating		7/16/2020 11:12:23 AM	
 Drop index Initiated by: System		Index name: AK_Product_Name_Dup Reason: Duplicate index		▶ Executing		7/16/2020 11:11:21 AM	
 Create index Initiated by: System		Table: [SalesOrderDetail] Indexed columns:[UnitPrice]		✓ Validating		7/16/2020 11:10:54 AM	
 Create index Initiated by: System		Table: [SalesOrderDetail] Indexed columns:[CarrierTrackingNumber]		⌛ Reverted		7/16/2020 2:36:33 AM	
 Drop index Initiated by: System		Index name: AK_Document_rowguid Reason: Duplicate index		✓ Success		7/10/2020 11:43:02 PM	
 Drop index Initiated by: System		Index name: IX_Person_LastName_FirstName_MiddleName_DUP Reason: Duplicate index		✓ Success		7/10/2020 6:59:28 PM	



DEMO

PERFORMANCE TUNING IN AZURE SQL DATABASE

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