Azure in Production

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COVERING

What

Website/Database

Why

How

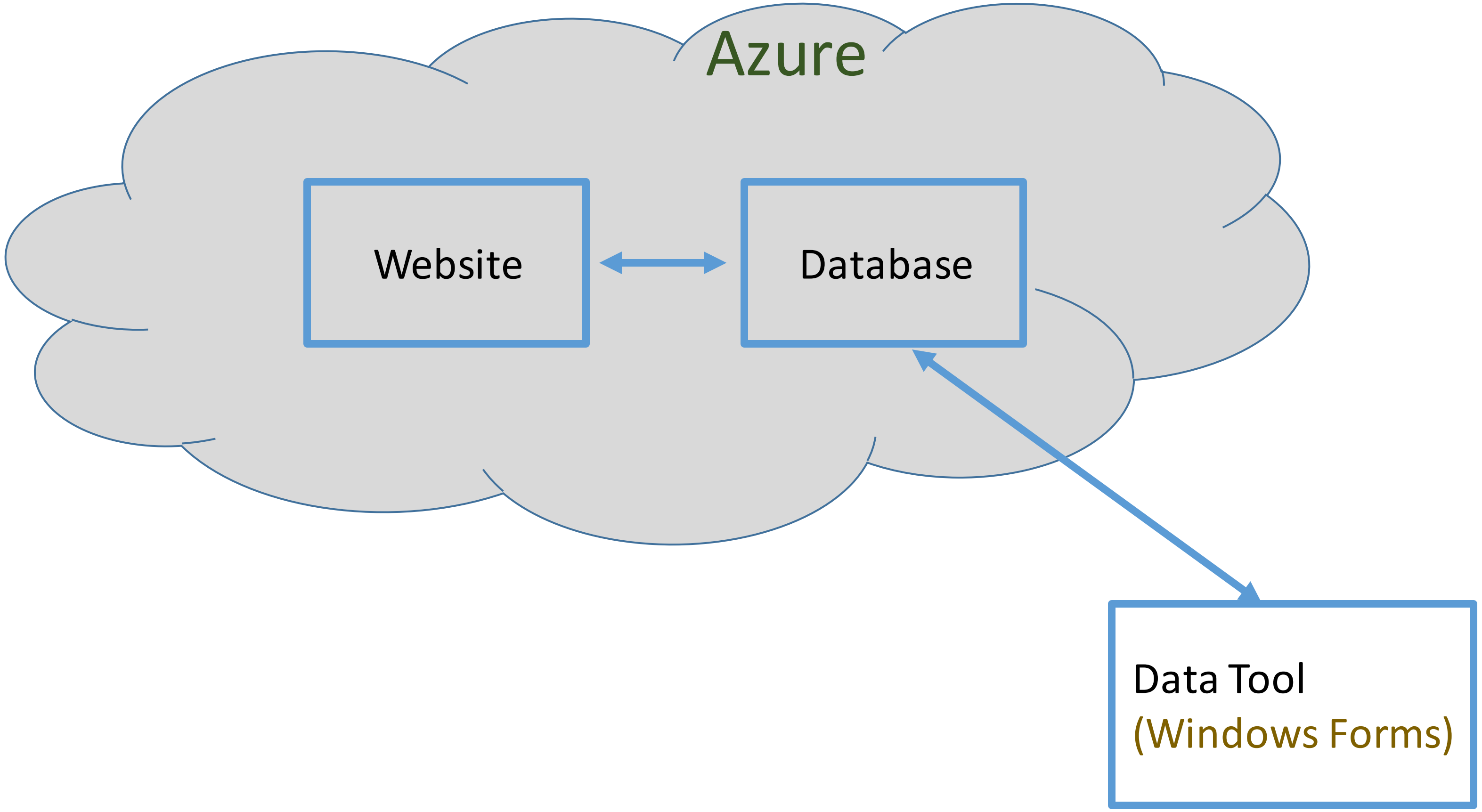
Costs

What

Azure is big. I am only using the Azure website and Azure database

- Running a website in Production for a year.
- Website handles the companies engineering processes.
- Used internally locally and a few other sites around the world.
- Roughly 20 users on at a time. Low requests (8K a day) but high data content.

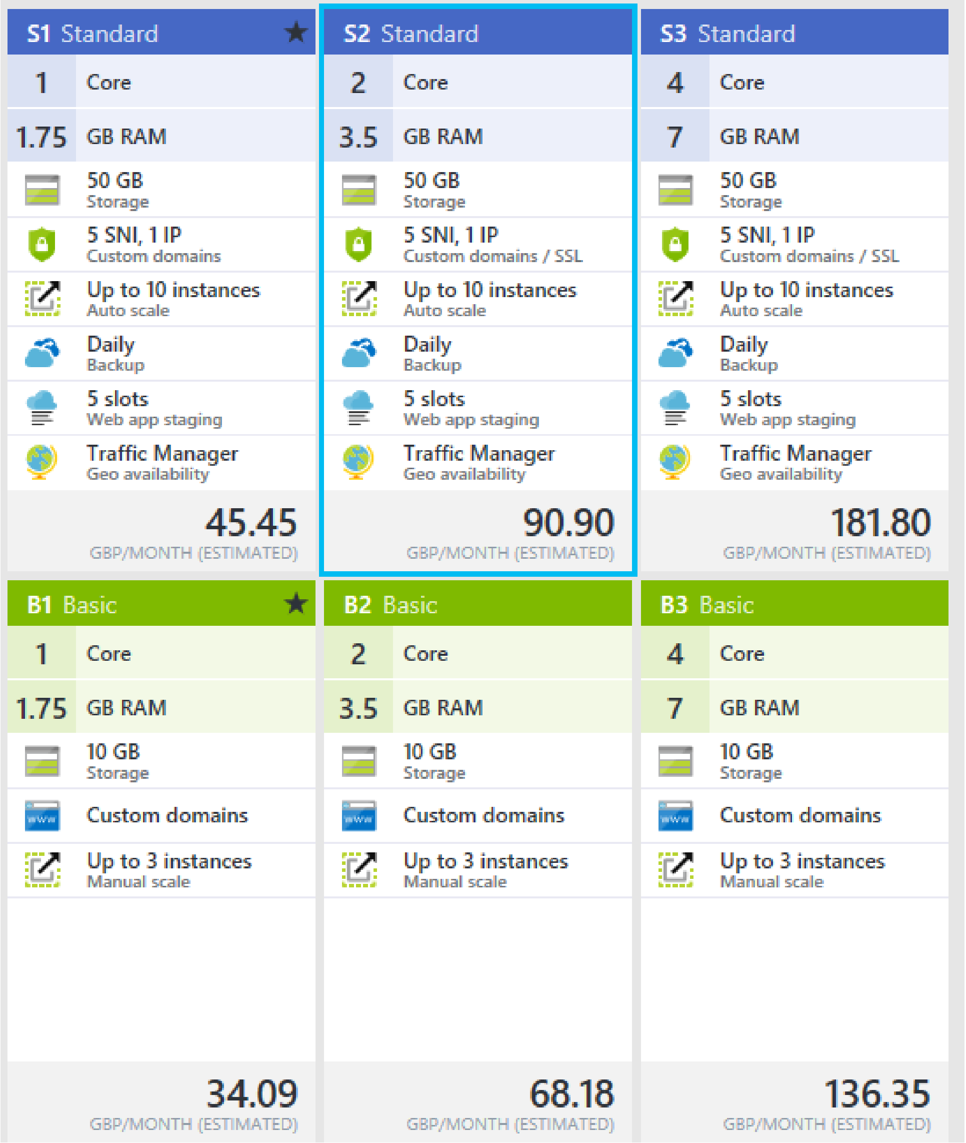
Key Technology:
ASP.Net MVC, c#, Telerik Kendo UI and reports,
Entity Framework 6 (code first) and a SQL Server database.


Azure
Website
Database
Data Tool
(Windows Forms)

Website

To host your website you need to setup an Azure Web Server (Web App)

- 11 Different scales from Free to Premium
- Pay per server
- Pay per minute
- Host as many web sites as you like on the server
- Can auto scale instances (pay for each)
- Easy to change. Takes about 10 minutes to jump between them.



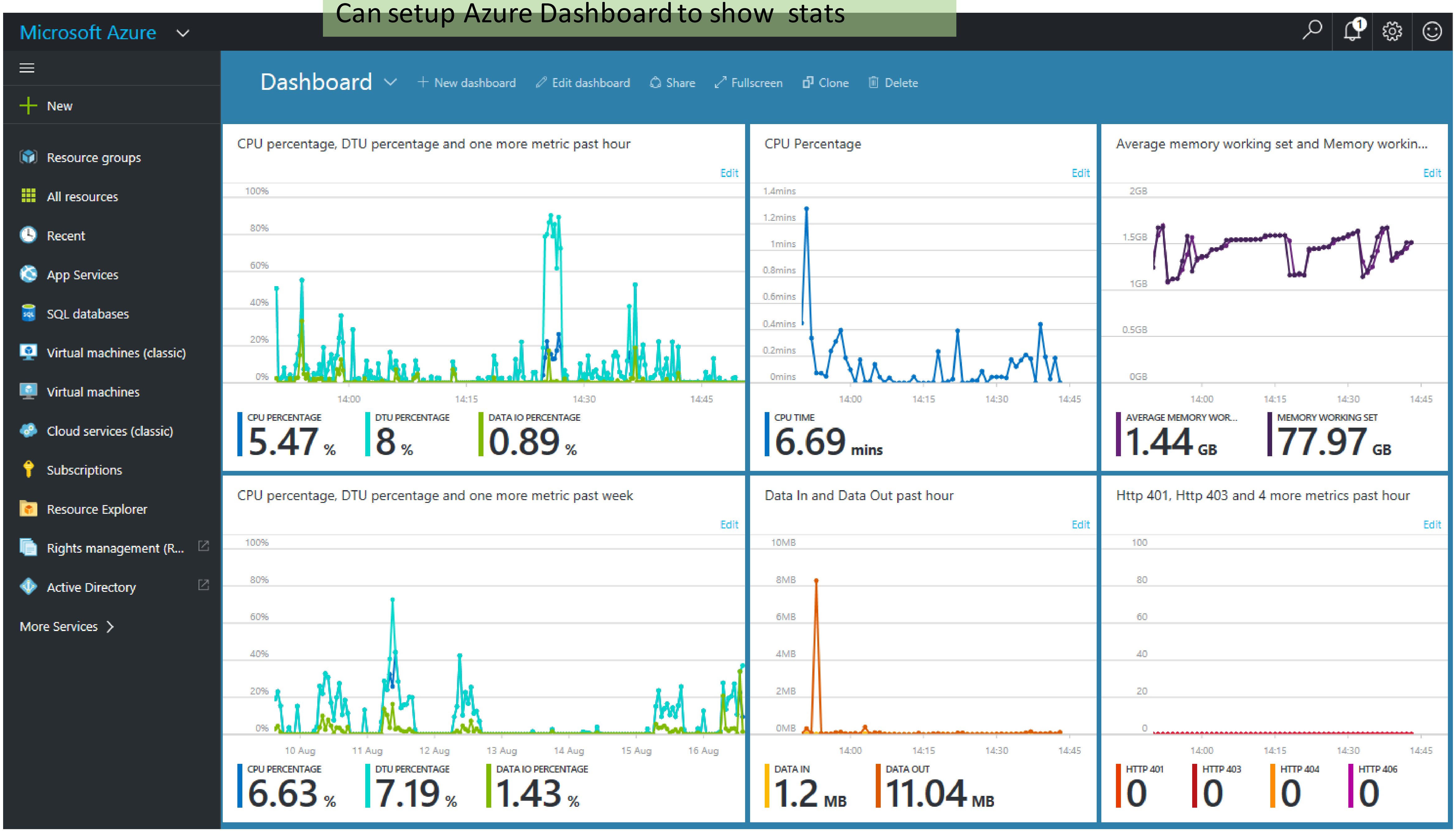
S1 Standard ★	S2 Standard	S3 Standard
1 Core	2 Core	4 Core
1.75 GB RAM	3.5 GB RAM	7 GB RAM
50 GB Storage	50 GB Storage	50 GB Storage
5 SNI, 1 IP Custom domains	5 SNI, 1 IP Custom domains / SSL	5 SNI, 1 IP Custom domains / SSL
Up to 10 instances Auto scale	Up to 10 instances Auto scale	Up to 10 instances Auto scale
Daily Backup	Daily Backup	Daily Backup
5 slots Web app staging	5 slots Web app staging	5 slots Web app staging
Traffic Manager Geo availability	Traffic Manager Geo availability	Traffic Manager Geo availability
45.45 GBP/MONTH (ESTIMATED)	90.90 GBP/MONTH (ESTIMATED)	181.80 GBP/MONTH (ESTIMATED)

B1 Basic ★	B2 Basic	B3 Basic
1 Core	2 Core	4 Core
1.75 GB RAM	3.5 GB RAM	7 GB RAM
10 GB Storage	10 GB Storage	10 GB Storage
Custom domains	Custom domains	Custom domains
Up to 3 instances Manual scale	Up to 3 instances Manual scale	Up to 3 instances Manual scale
34.09 GBP/MONTH (ESTIMATED)	68.18 GBP/MONTH (ESTIMATED)	136.35 GBP/MONTH (ESTIMATED)

Website

- Can publish to web site from Visual Studio.
- You have FTP access to the site and logs.
- You can do backups if you store local data.
- Haven’t had any problems over the year. Publish and let it run.
- CPU Performance is good. For example local i7 desktop was taking 89secs compared to 100secs on the web server.

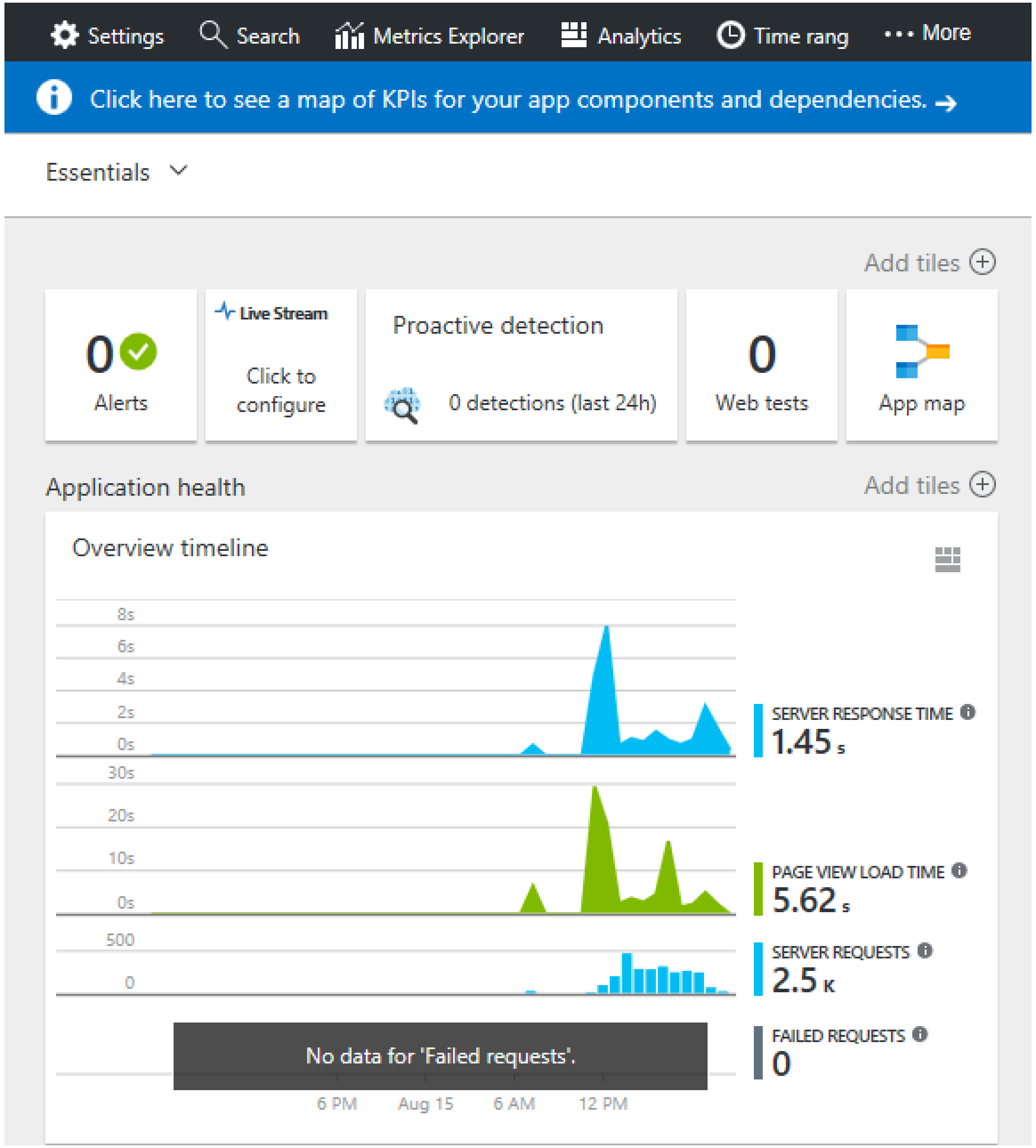
Can setup Azure Dashboard to show stats



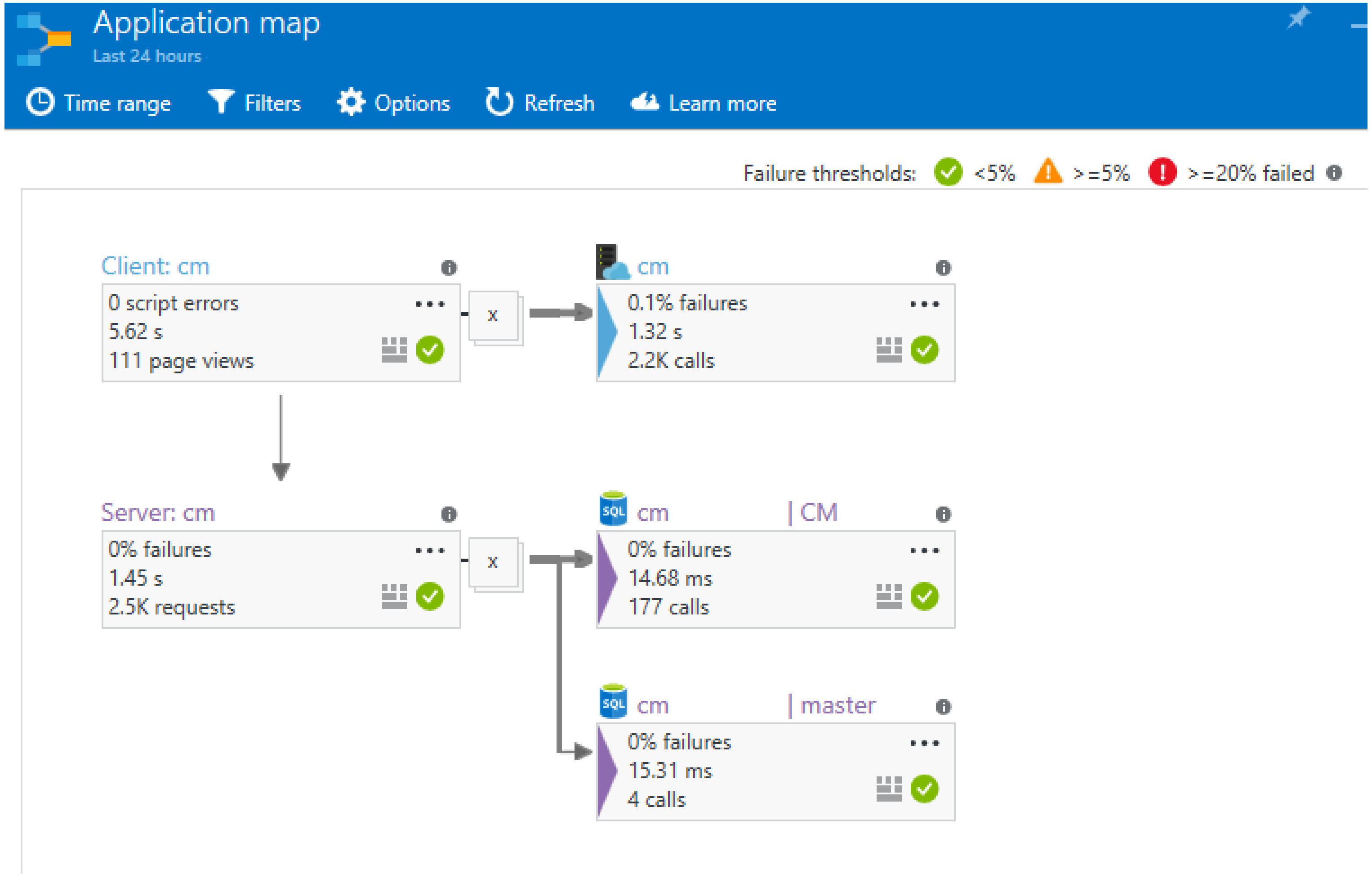
As well as server resources charts you have all your web page analytics.

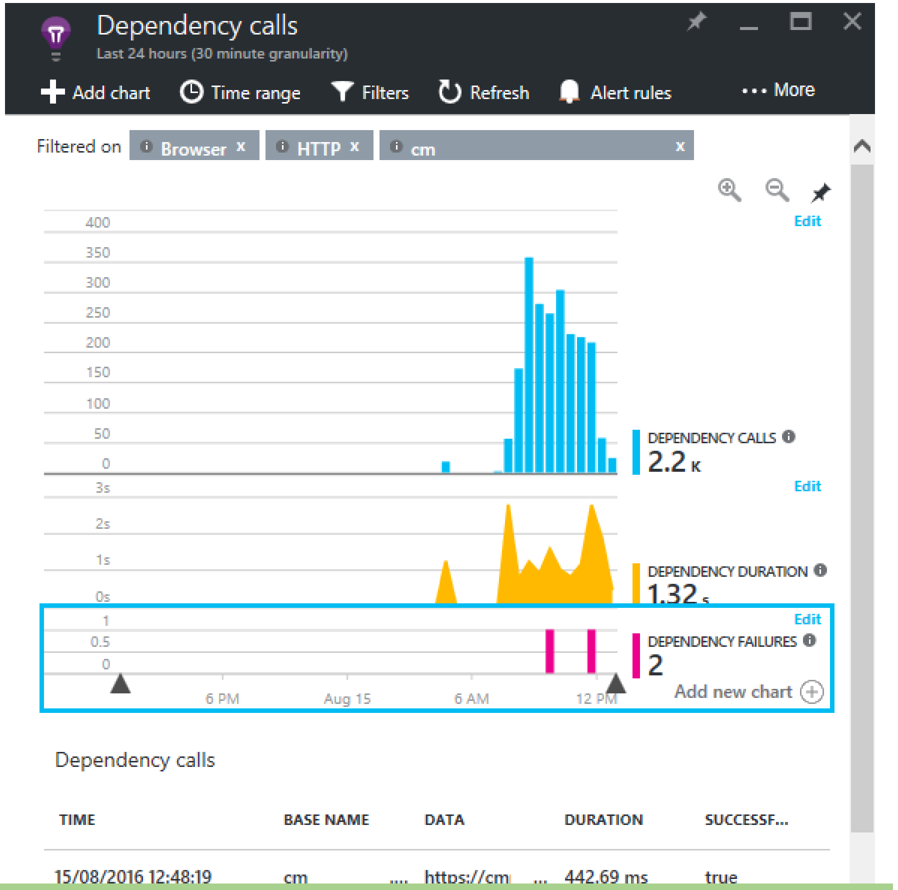
Azure portal can give you an overview and graphical drill down to the requests.

A separate Analytics portal gives you access to all data. Allows you to run queries and chart as you like.


Click here to see a map of KPIs for your app components and dependencies.

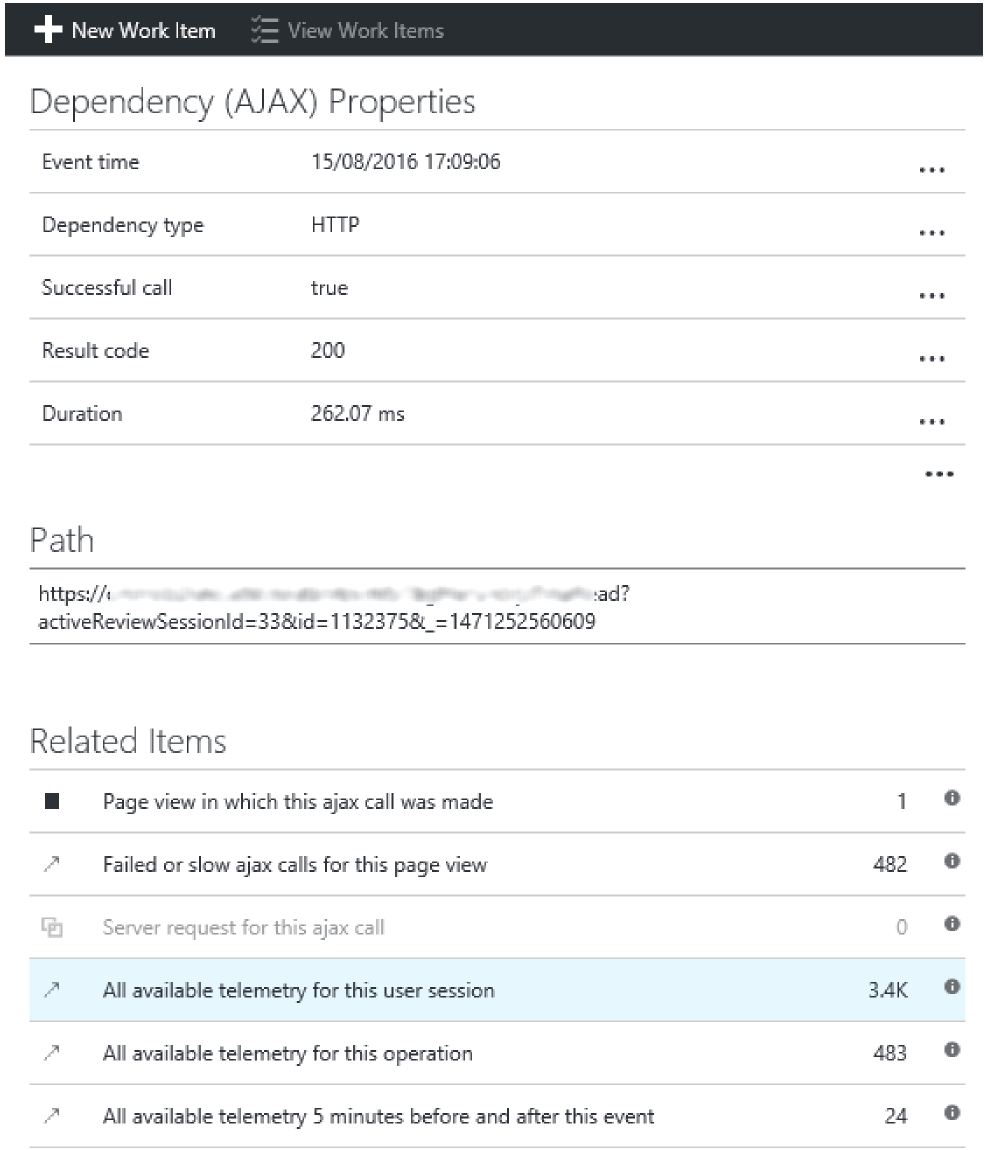
No data for 'Failed requests'.


Application map
Last 24 hours
Time range
Filters
Options
Refresh
Learn more
Failure thresholds: ✓ <5% ⚠ >=5% ❗ >=20% failed
Client: cm
0 script errors
5.62 s
111 page views
x
cm
0.1% failures
1.32 s
2.2K calls
Server: cm
0% failures
1.45 s
2.5K requests
x
cm | CM
0% failures
14.68 ms
177 calls
cm | master
0% failures
15.31 ms
4 calls



Dependency calls

TIME	BASE NAME	DATA	DURATION	SUCCESSF...
15/08/2016 12:48:19	cm	https://cm ...	442.69 ms	true



Dependency (AJAX) Properties

Event time	15/08/2016 17:09:06	...
Dependency type	HTTP	...
Successful call	true	...
Result code	200	...
Duration	262.07 ms	...

Path

https://[redacted]ad?activeReviewSessionId=33&id=1132375&_=1471252560609

Related Items

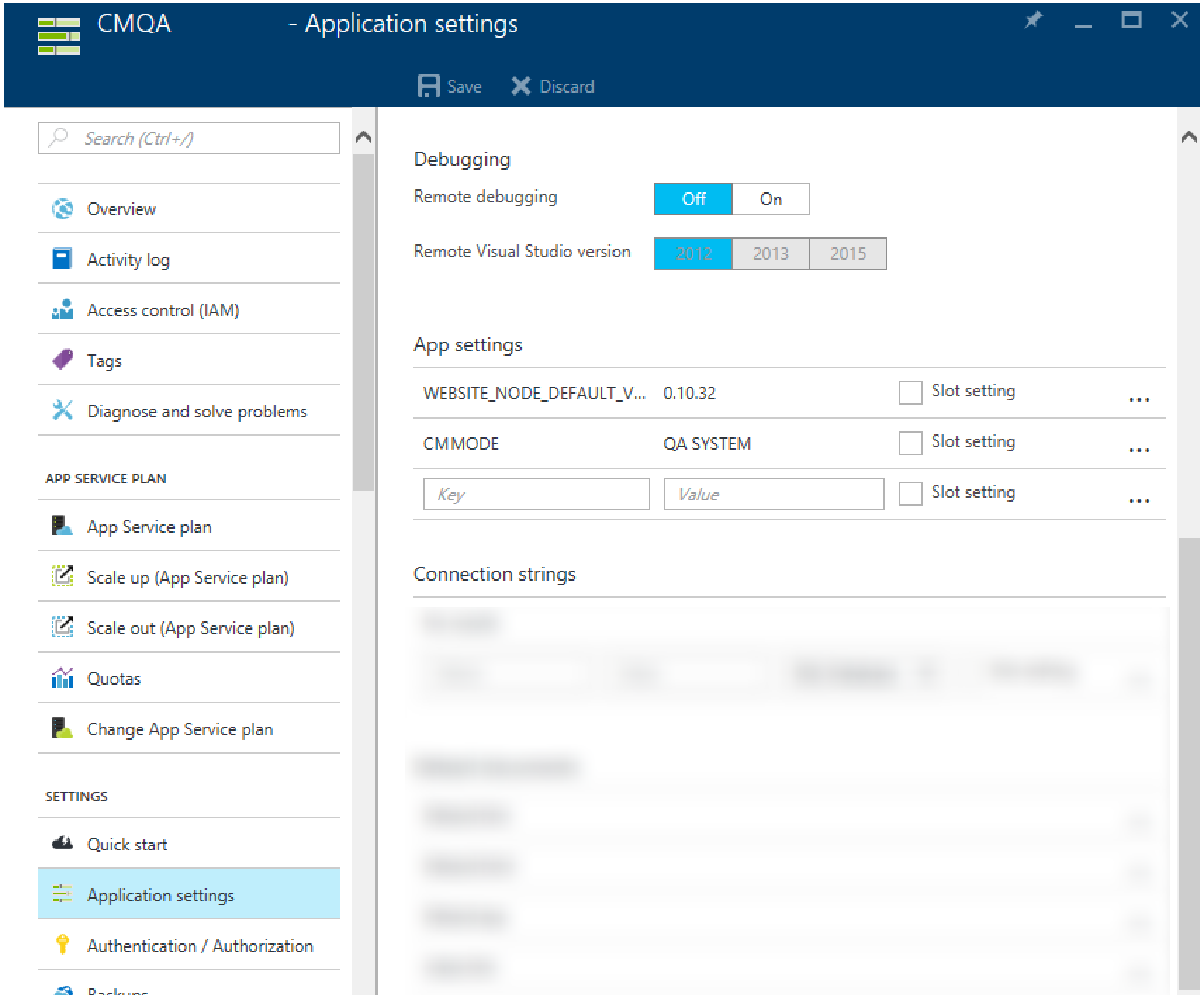
Page view in which this ajax call was made	1	❶
Failed or slow ajax calls for this page view	482	❶
Server request for this ajax call	0	❶
All available telemetry for this user session	3.4K	❶
All available telemetry for this operation	483	❶
All available telemetry 5 minutes before and after this event	24	❶

Can drill down to the client browser usage.

Can select a bar and keep drilling down to an individual request. From there you can find related items.

Settings

- Various feature controls
- Dotnet version
- Debugging logs
- App Settings
- Connection Strings



Debugging

Remote debugging [✓ Off] On

Remote Visual Studio version [✓ 2012] 2013 2015

App settings

WEBSITE_NODE_DEFAULT_V...	0.10.32	□ Slot setting	...
CMMODE	QA SYSTEM	□ Slot setting	...
Key	Value	□ Slot setting	...

Connection strings

Debugging

- Logs can be turned on and off.
- Can pick up logs via visual studio or FTP or portal.
- Can stream output to visual studio output window.
- Can attach visual studio debugger to Azure site.

Website summary

- Simple and flexible.
- Easy setup.
- No maintenance.
- Had no issues over the year.
- The logging, debugging and charting was enough for my purpose.

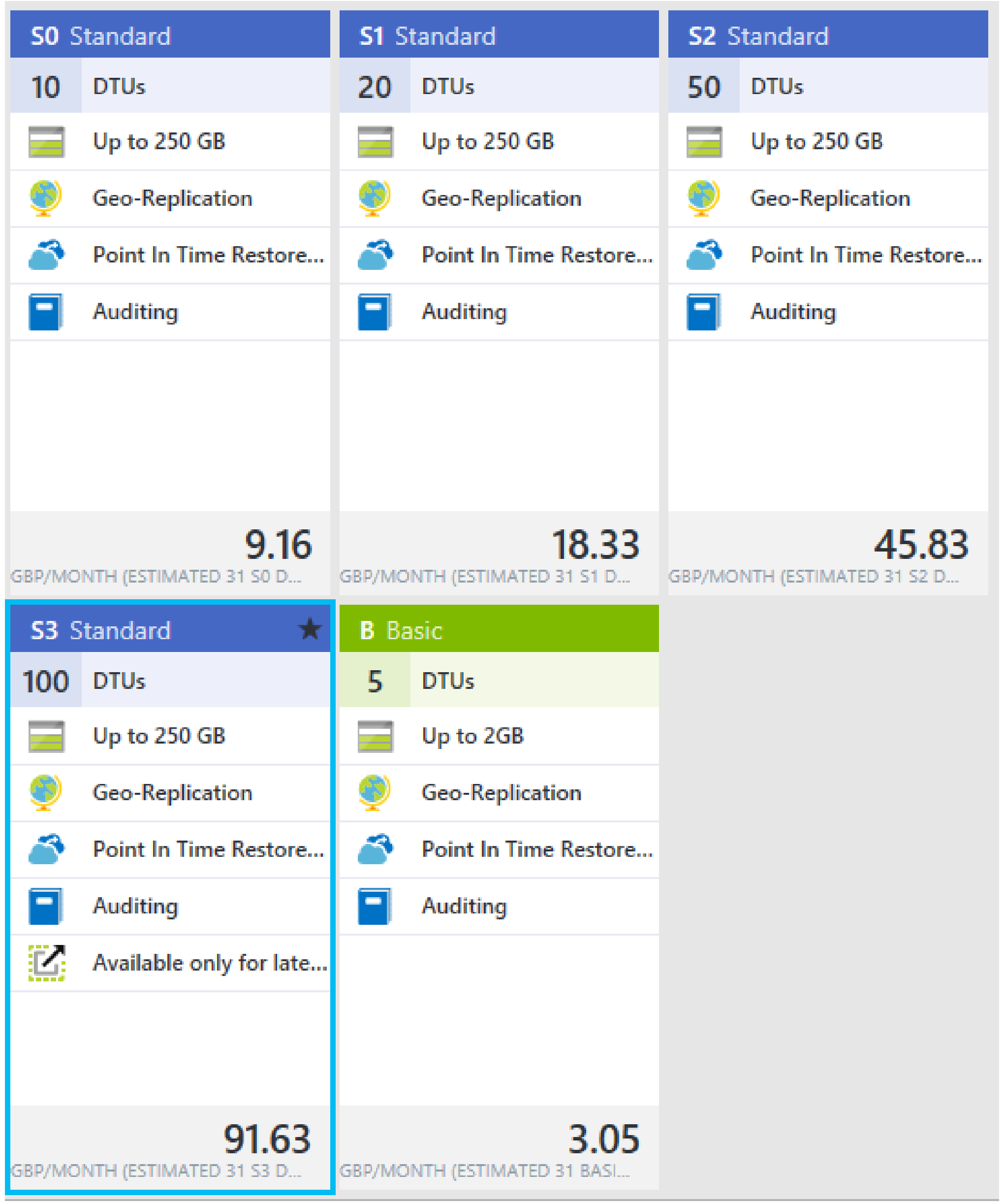
Database

Azure Database is a single database rather than database server. Can chose from 11 plans ranging from a very Basic to Premium.

- Pay per database not per server
- Pay per minute
- Easy to change. Takes about 15 minutes to jump between them.

A server is created to hold your databases but billing/control is per database.

“Elastic database” allows underutilised databases to all sit under the same plan.



S0 Standard
10 DTUs
Up to 250 GB
Geo-Replication
Point In Time Restore...
Auditing
9.16
GBP/MONTH (ESTIMATED 31 S0 D...

S1 Standard
20 DTUs
Up to 250 GB
Geo-Replication
Point In Time Restore...
Auditing
18.33
GBP/MONTH (ESTIMATED 31 S1 D...

S2 Standard
50 DTUs
Up to 250 GB
Geo-Replication
Point In Time Restore...
Auditing
45.83
GBP/MONTH (ESTIMATED 31 S2 D...

S3 Standard ★
100 DTUs
Up to 250 GB
Geo-Replication
Point In Time Restore...
Auditing
Available only for late...
91.63
GBP/MONTH (ESTIMATED 31 S3 D...

B Basic
5 DTUs
Up to 2GB
Geo-Replication
Point In Time Restore...
Auditing
3.05
GBP/MONTH (ESTIMATED 31 BASI...

Database

- Its not SQL Server but a variant where all main features work fine.
- I develop locally on SQL Server 2014 and need no changes for Azure Database.
- Entity Framework now works fine.
- Batch SQL insert/updates work fine.

Database

- The database is behind a firewall. You have to specify if Azure services have access and/or what IP ranges are allowed access.
- You can setup users and permissions as in SQL Server.
- Provided your machine is given access then the connection string can be used like any other. You can use the SQL Server management tool, Visual studio, ODBC etc. to connect to the database.

I have windows form based tool that I run locally to perform some of the large data imports/exports to avoid loading the website.

It shares the same libraries as my website so works as easily with Azure Database as it does a local SQL server.

Database

- Backups are to a point in time going back weeks. Depends on the plan.
- You can download a snapshot of the database at any time. This can be restored on a local SQL Server easily.
- You can push a local SQL server database to Azure. It will create a new Azure database and transfer the data.
- I have a nightly script that pulls a copy locally.

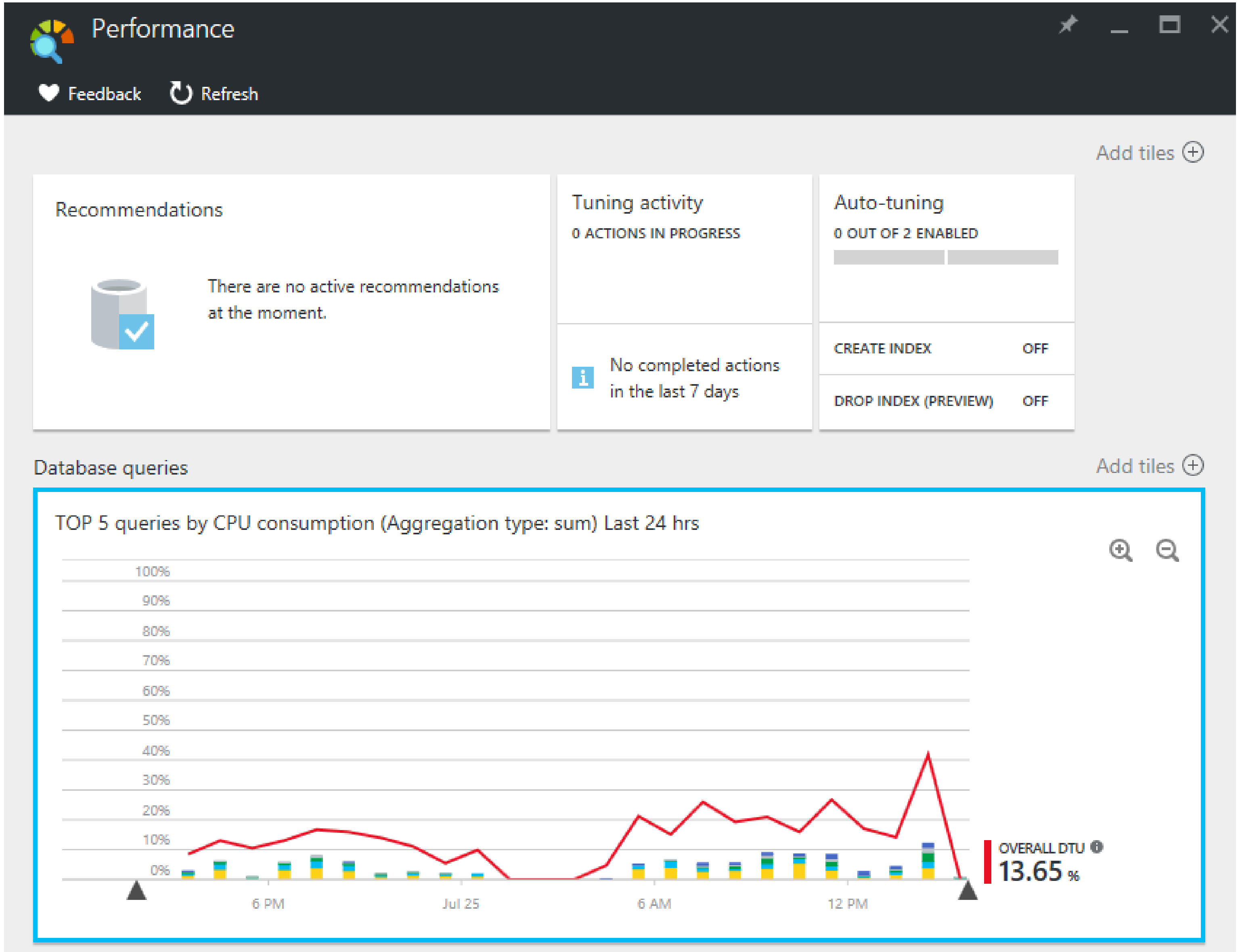
Database DTU

The database scaling is based on DTU. The more money you pay the more DTU you get.

Its appears to be based on a combination of CPU, Memory, Disk IO and Network IO.

Recent Azure changes allow greater visibility of these in the monitoring.

- You can pin all your monitoring to the Azure Dashboard
- There is a nice performance monitoring view ->



Performance

Feedback Refresh

Add tiles

Recommendations

There are no active recommendations at the moment.

Tuning activity

0 ACTIONS IN PROGRESS

No completed actions in the last 7 days

Auto-tuning

0 OUT OF 2 ENABLED

CREATE INDEX OFF

DROP INDEX (PREVIEW) OFF

Database queries

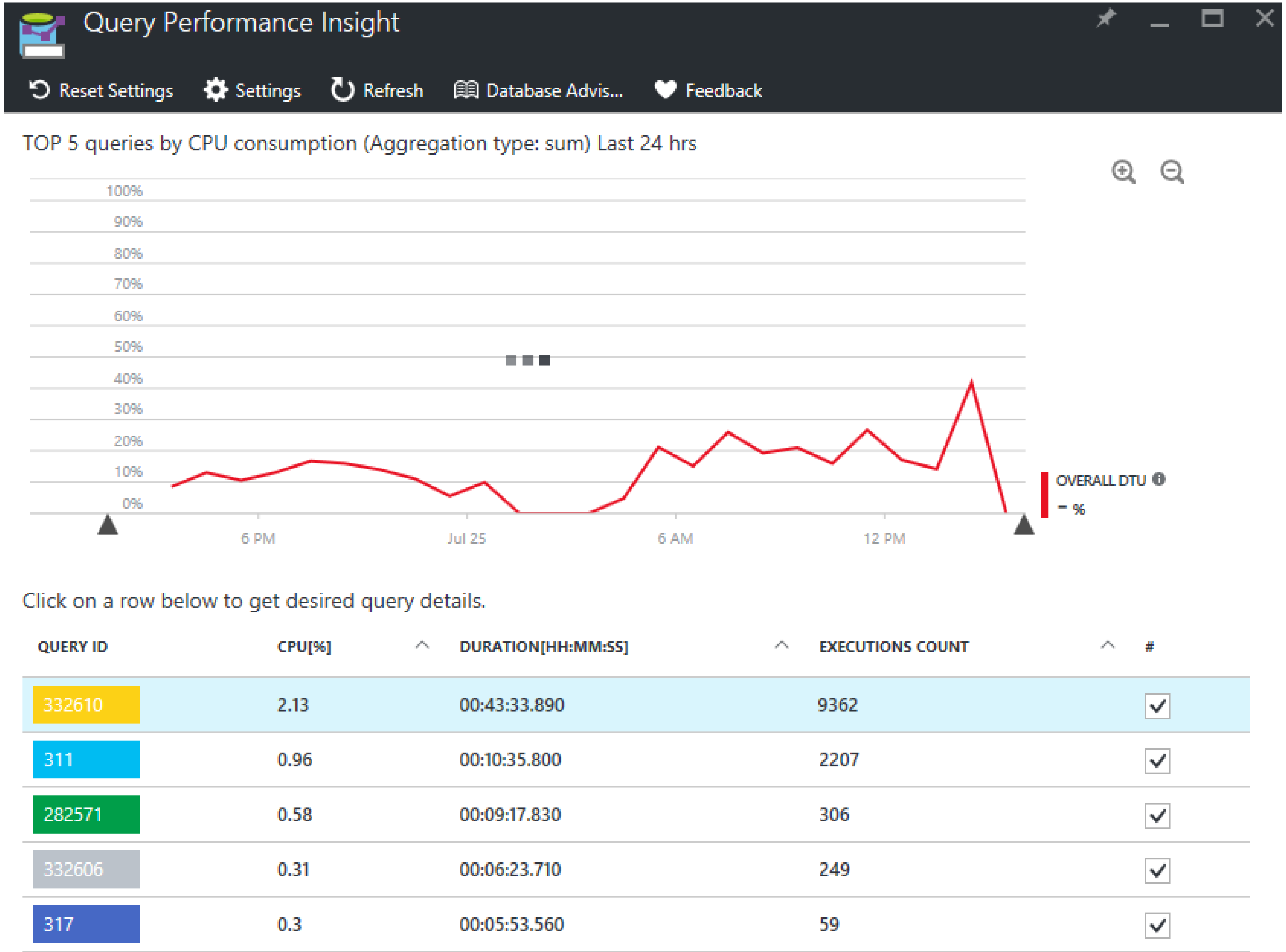
Add tiles

TOP 5 queries by CPU consumption (Aggregation type: sum) Last 24 hrs

OVERALL DTU

13.65 %

You can drill down to see the top queries

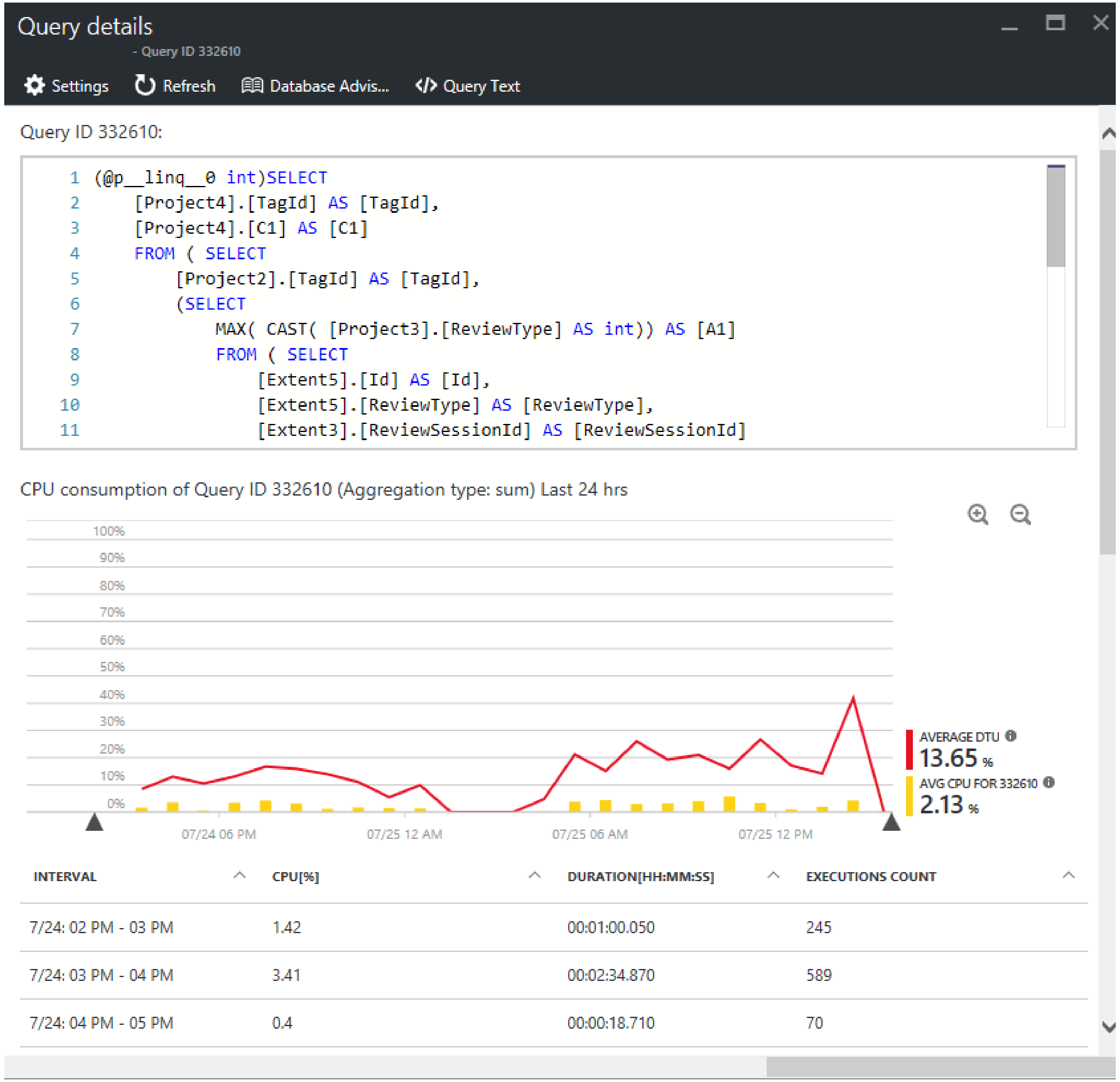


TOP 5 queries by CPU consumption (Aggregation type: sum) Last 24 hrs

Click on a row below to get desired query details.

QUERY ID	CPU[%]	DURATION[HH:MM:SS]	EXECUTIONS COUNT	#
332610	2.13	00:43:33.890	9362	☑
311	0.96	00:10:35.800	2207	☑
282571	0.58	00:09:17.830	306	☑
332606	0.31	00:06:23.710	249	☑
317	0.3	00:05:53.560	59	☑

Can keep drilling down until you get to the SQL.



Query ID 332610:

```
(@p__linq__0 int)SELECT
    [Project4].[TagId] AS [TagId],
    [Project4].[C1] AS [C1]
    FROM ( SELECT
        [Project2].[TagId] AS [TagId],
        (SELECT
            MAX( CAST( [Project3].[ReviewType] AS int)) AS [A1]
            FROM ( SELECT
                [Extent5].[Id] AS [Id],
                [Extent5].[ReviewType] AS [ReviewType],
                [Extent3].[ReviewSessionId] AS [ReviewSessionId]
```

CPU consumption of Query ID 332610 (Aggregation type: sum) Last 24 hrs

INTERVAL	CPU[%]	DURATION[HH:MM:SS]	EXECUTIONS COUNT
7/24: 02 PM - 03 PM	1.42	00:01:00.050	245
7/24: 03 PM - 04 PM	3.41	00:02:34.870	589
7/24: 04 PM - 05 PM	0.4	00:00:18.710	70

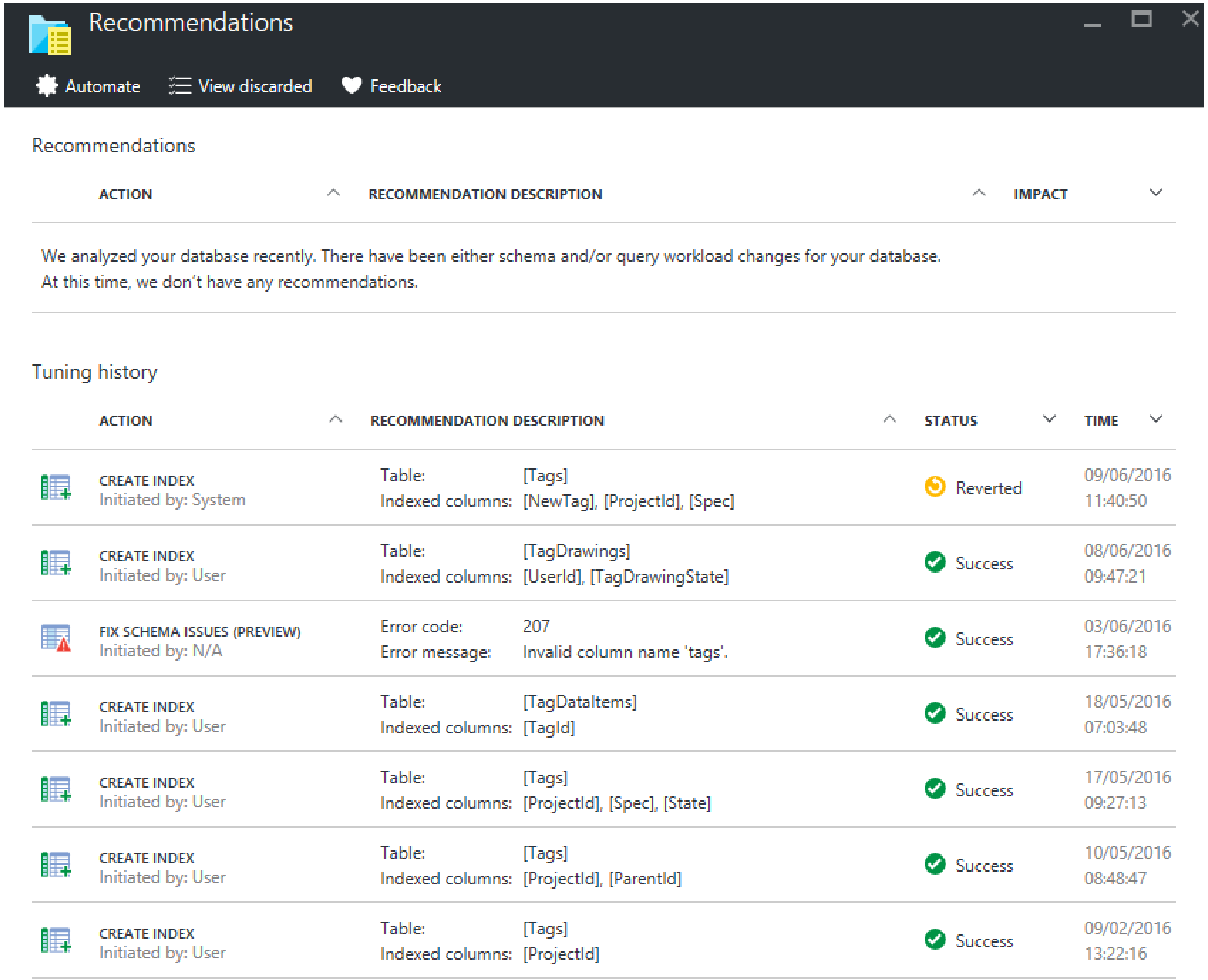
A recent addition is “Recommendations”.

It will give you a notification where it thinks a new index can improve performance.

Ranks them from Low to High.

You can apply the change and it will monitor its impact over a few days.

It will then decide to rollback or leave.



Recommendations

ACTION	RECOMMENDATION DESCRIPTION	IMPACT

We analyzed your database recently. There have been either schema and/or query workload changes for your database.
At this time, we don't have any recommendations.

Tuning history

ACTION	RECOMMENDATION DESCRIPTION	STATUS	TIME
CREATE INDEX Initiated by: System	Table: [Tags] Indexed columns: [NewTag], [ProjectId], [Spec]	Reverted	09/06/2016 11:40:50
CREATE INDEX Initiated by: User	Table: [TagDrawings] Indexed columns: [UserId], [TagDrawingState]	✓ Success	08/06/2016 09:47:21
FIX SCHEMA ISSUES (PREVIEW) Initiated by: N/A	Error code: 207 Error message: Invalid column name 'tags'.	✓ Success	03/06/2016 17:36:18
CREATE INDEX Initiated by: User	Table: [TagDataItems] Indexed columns: [TagId]	✓ Success	18/05/2016 07:03:48
CREATE INDEX Initiated by: User	Table: [Tags] Indexed columns: [ProjectId], [Spec], [State]	✓ Success	17/05/2016 09:27:13
CREATE INDEX Initiated by: User	Table: [Tags] Indexed columns: [ProjectId], [ParentId]	✓ Success	10/05/2016 08:48:47
CREATE INDEX Initiated by: User	Table: [Tags] Indexed columns: [ProjectId]	✓ Success	09/02/2016 13:22:16

DTU Problems

All the little problems have been cleared in recent updates.

Only one thing remains if I started a new project…

Managing the DTU’s

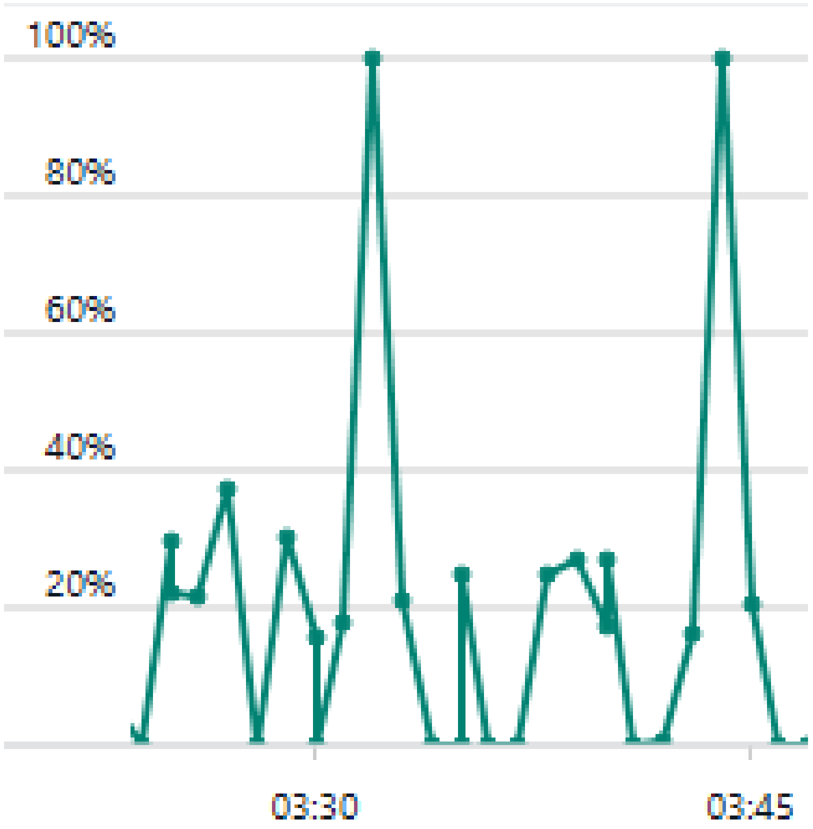
Everything works fine if your system uses the database resources in a balanced way. However my system is data heavy and I need to call upon a large amount of data sometimes.

DTU Problems

- Running a 50 DTU Database
- Usually sitting under 20 DTU usage even when pulling some large data.
- However pull a few bytes to much on the network and it passes some unknown limit. This turns on the brakes.
- Queries can suddenly jump from a few seconds to minutes. (35sec went to almost 5 mins)
- Two solutions –

a) 100 DTU database which raised the trigger limit.

b) Code changes.



Coding

- The link between the web server and the database is a variable network connection.
- Once you take that into account you need to minimise data flow between the two.
- I use Entity Framework code first. With any entity usage I need to be aware of what entities are being built and what fields are in use as it will impact that database data link.

Wanted to gather some data together in a Dictionary. I used the following code…

```
Dictionary<int, int> d = _context.ItemDrawings
             .Where(x => x.ProjectId == _projectId)
             .ToDictionary(x => x.ItemId, x => x.Id);
```

Here the Entity framework will result in a Select * SQL that will pull all the fields to create the ItemDrawing entities in memory before using the two fields to build the Dictionary.

To optimise..

```
Dictionary<int, int> d = _context.ItemDrawings
             .Where(x => x.ProjectId == _projectId)
             .Select(x => new { x.ItemId, x.Id } )
             .ToDictionary(x => x.ItemId, x => x.Id);
```

Adding the Select lets the Entity Framework know your only interested in that two fields so it will not create the entity objects. It generates only enough SQL to get the dictionary contents.

The first results in a large transfer of network data possibly trigging a Max DTU event and the second gives small network data causing no problems. Also memory usage for first was 279Mb and the second 6Mb

Database Summary

- Easy setup
- Work as if SQL Server
- No maintenance
- Be aware the network and DTU limits

Why Azure

- Company had no existing infrastructure that could host the site.
- IT already busy enough and didn't need the extra work.
- I didn’t want IT creep.
- No large upfront costs in time or money.
- No service commitments. Could have been a short lived project.
- I had played with Azure in the past and fitted my experience.
- Wanted good accessibility from around the world.

How

Getting Azure setup was a hassle.

Two phases:

1. Initial Development using MSDN subscription Easy
2. Moving to Production Hard

MSDN Subscription

I have a MSDN subscription.

Along with the visual studio goodies you get £95 of Azure credits a month to use on any of the Azure services.

- You can setup an Azure Account under your MSDN user easily.
- The £95 resets each month and doesn't carry forward. If you run out then everything is disabled until the following month.
- 40% discount on all Azure costs.
- I used it initially to get the basics up and approved before setting up an Azure account to run the Production website.
- You not allowed to run Production with MSDN subscription.
- MSDN Pro Edition costs £443 each year for 3 years (£35 Azure Credits). Enterprise £2900.

Azure Credits

Setting up the production Azure was were the problems started.

The Azure websites say its easy to pay.

Just give a credit card and away you go….

- I am not using my credit card
- The company doesn’t want me running wild with theirs

Companies like invoicing and budgets.

Solution is to purchase Azure Credit.

Azure Credits

Credits can be bought like any other Microsoft volume licenses.

Purchased £1500 of credit and once applied you can use it to pay for any of the Azure services. Your burn rate is charted so you can follow your spending easily.

My advise would be go get help.

The Azure web help is confusing. Calls to Microsoft support was as well so I gave up.

I ended up talking my software distributer. After that I was up and running quickly and easily.

Greymatter

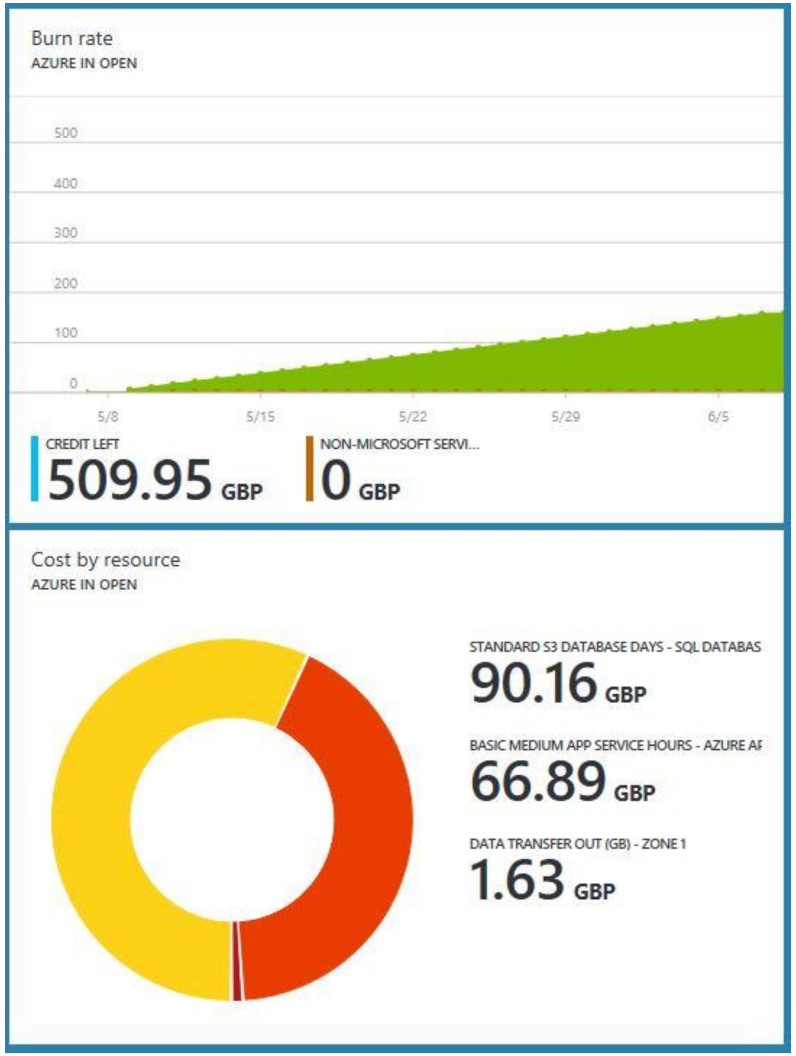
David Stewart: dstewart@greymatter.com or for the team isv@greymatter.com

http://www.greymatter.com/

Azure Credits

You can pin to the Azure Dashboard your monthly credit usage.

Excel exports are available if you need to delve deeper into costs or create reports.



Burn rate
AZURE IN OPEN

CREDIT LEFT
509.95 GBP

NON-MICROSOFT SERVI...
0 GBP

Cost by resource
AZURE IN OPEN

STANDARD S3 DATABASE DAYS - SQL DATABAS
90.16 GBP

BASIC MEDIUM APP SERVICE HOURS - AZURE AF
66.89 GBP

DATA TRANSFER OUT (GB) - ZONE 1
1.63 GBP

Azure Costs

Azure is not cheap.

If your decision is based purely on hardware/software cost then its more expensive.

In over a year we spent NO time on hardware setup or maintenance or on any IT support.

If you include the money saved by not having all that distractions then it will work out a lot cheaper.

Want to sell it to your boss then that is the big selling point.