

GeoDR - Read Scale-Out Troubleshooting

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Issue

If Read Scale-Out is enabled for a database, and if the database is Premium edition, then customer logins with the TDS ApplicationIntent parameter set to ReadOnly will be routed by the gateway to the local secondary replica with the lowest node number instead of the primary replica. This feature does not work on Standard/Basic databases -- you can enable read scale-out on those databases, but it will not do anything.

Analysis / Troubleshoot

NOTE: most of these steps can more easily be performed using the XTS view "Read Scale-Out Troubleshooting.xts"

1. Verify that read scale-out is enabled for the database in CMS.

Select read_scale_units, state, edition from logical_databases where logical_server_name = '{logical_server_name}' and logical_database_name = '{logical_database_name}'

- read_scale_units will be '1' if the feature is enabled and '0' if the feature is disabled. Customer can enable or disable the feature using Set-AzureRmSqlDatabase Azure PowerShell cmdlet.
- Edition needs to be Premium, else it will not work.

2. Verify that SQL Alias has correct read_scale_units value

Select read_scale_units from sql_aliases where server_name = "{logical_server_name}" and database_name = "{logical_database_name}"

- Value should be '1' if feature is enabled and '0' if feature is disabled

3. Verify that SQL Alias cache replicas have correct value for read_scale_units

- Use SqlAliasCacheReplicas.xts to verify that read_scale_units is '1' for this database in the SQL alias databases where the alias is present

4. Verify that (at least some of) the customer's logins are using ApplicationIntent = ReadOnly. Only logins using ApplicationIntent = ReadOnly will be routed to the secondary replica. Note that only Gateway knows whether ApplicationIntent is ReadOnly.

MonLogin

```
| where logical_server_name == "{logical_server_name}" and database_name contains "{logical_database_name}"
| where event == "process_login_finish" and package == "xdbgateway" and event == "process_login_finish"
| extend bit21 = toint(login_flags / 2097152) % 2
| extend applIntentReadOnly = bit21
| summarize count() by bin(originalEventTimestamp, time(1h)), is_success, instance_port, applIntentReadOnly
| project originalEventTimestamp, applIntentReadOnly, is_success, count_, instance_port
| sort by originalEventTimestamp desc
```

- Above query will show number of logins with and without ApplicationIntent = ReadOnly aggregated over periods of 1 hour. If there are no logins at all with applIntentReadOnly = 1, then the customer will not be routed to the secondary replica. Linked user guide above tells customers how to set ApplicationIntent correctly in the client.

5. Verify that ApplIntentReadOnly connections are being routed to a secondary replica by the gateway.

Using query from previous step, you can compare logins with readOnlyApplIntent = 1 against logins with readOnlyApplIntent = 0. They should be routed to different nodes, ie, they should have different instance_port values depending on app intent.

- ### 6. Verify that tenant ring logins are succeeding and are going to the correct node.
- Eg, if previous query gives a mix of applIntentReadOnly = 1 and applIntentReadOnly = 0, then you should see logins succeeding on the tenant rings to two different DB nodes with comparable numbers -- one node corresponds to the read only logins and the other node corresponds to the other logins in gateway.

MonLogin

```
| where logical_server_name == "{logical_server_name}" and database_name contains "{logical_database_name}"
| where event == "process_login_finish" and package == "sqlserver"
| summarize count_success = sum(is_success), count_failure = sum(1 - is_success) by
bin(originalEventTimestamp, time(1h)), ClusterName, NodeName
| project originalEventTimestamp, count_success, count_failure, NodeName, ClusterName
| sort by originalEventTimestamp desc
```

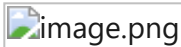
7. Verify that node names from previous queries match current primary and secondary replicas respectively.

- Open database replicas view and check what are the current replicas for the database. Logins from above queries should be going to the Primary replica if they have applIntentReadOnly = 0, and they should be going to the Secondary replica with the lower node number if they have applIntentReadOnly = 1.

8. [If you want to be extra sure] Verify whether there are active customer sessions on the Secondary replica with the lowest node number.

- In database replicas view, click secondary replica with lowest node number, then open "Sessions" tab on the right. This will show all currently active sessions. Check the host_name, program_name, and login_name columns to determine whether the sessions are user connections or internal connections. If they are, then obviously the customer is currently connected to the secondary replica and so routing is probably working fine.

Below shows customer sessions in read scale-out replica:



Tests that the customer can run themselves to see whether they are connected to a secondary replica

```
select databasepropertyex(db_name(), 'Updateability')
```

--> returns READ_ONLY on a geo-secondary or readable secondary, returns READ_WRITE on a primary replica

Alternate Mitigation option :

One possible mitigation for read-scale not working (the feature is on but still use primary node), disable it then re-enable via CAS commands. Engage GeoDR engineering thru ICM to assist further.

Public Doc Reference

See below link for customer guide on enabling/disabling read scale-out, and on logging into secondary replicas when read scale-out is enabled. This will also help you understand the feature if you are not familiar 😊

<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-read-scale-out#enable-and-disable-read-scale-out-using-azure-powershell>

https://microsoft.sharepoint.com/teams/SQLDSRAP/_layouts/15/guestaccess.aspx?guestaccesstoken=SmUDyEMW3zGy67d%2fg06U%2bll%2fYByHeGNyXyijimgaVho%3d&docid=2_011ff3f28f8b8495290c915424aa4f720&rev=1

Classification:

Root Cause: Azure SQL DB v2/GeoDR/ReadScaleout

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