

Troubleshooting Resource Health events

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Issue

The idea of this TSG to address common questions from customers regarding resource health events and develop an understanding of scenarios which customer will encounter and how to navigate them.

Background on RHC

What is Resource Health?

Resource Health for Azure SQL Database helps you diagnose and get support when an Azure issue impacts your SQL resources. It informs you about the current and past health of your resources and helps you mitigate issues.

Resource Health provides technical support when you need help with Azure service issues

Resource Health reflects current and historical data for unavailability of Azure SQL resource caused due to service issues. This data makes it easy for you to see if an SLA was violated.

How does RHC works?

Resource Health determines the health of your SQL resource by examining the success and failure of logins to the resource. Currently, Resource Health for your SQL Database resource only examines login failures due to system error and not user error. The Resource Health status is updated every 1 to 2 minutes. If a resource is unhealthy, Resource Health analyzes additional information to determine the source of the problem. It also reports on actions that Microsoft is taking to fix the problem and identifies things that you can do to address it.

RHC States for Azure SQL DB

Available

A status of Available means that Resource Health has not detected login failures due to system errors on your SQL resource.

No action required.

Degraded

A status of Degraded means that Resource Health has detected a majority of successful logins, but few (less than 25% of total logins) failures as well. These are most likely transient login errors. This is a just a notification to customer that a small percentage of logins have failed. There is no action required from customer or support as DB is still online.

Customer can see Degraded status for longer than 2 mins and it should not be alarming as the DB is not unavailable and only a small subset of logins are failing. Some of these logins are succeeded eventually through use of retry logic.

Since resource health is an independent Azure service which monitors all the services on Azure, it tracks SQL DB as well. However due to the way SQL DB is designed it will go through reconfigurations due to resource load balancing- planned maintenance, Unplanned Maintenance, update SLO. The resource health detects these and publishes the alerts however these alerts are not indicating SQL DB unavailability and the service is generally back to healthy state soon.

Action Expected from customer: - Since these are most likely transient login errors. To reduce the impact of connection issues caused by transient login errors, implement retry logic in your code which will make these errors invisible to the application.

Unknown

The health status of Unknown indicates that Resource Health hasn't received information about this resource for more than 10 minutes. Although this status isn't a definitive indication of the state of the resource, it is an important data point in the troubleshooting process. If the resource is running as expected, the status of the resource will change to Available after a few minutes. If you're experiencing problems with the resource, the Unknown health status might suggest that an event in the platform is affecting the resource.

Action on Customer - Test if they can connect to DB to determine if DB is available and we are hitting unknown status due to telemetry not flowing between RHC and SQL DB health signals.

Unavailable

A status of Unavailable means that Resource Health has detected consistent login failures to your SQL resource. If your resource remains in this state for an extended period of time, contact support.

This can happen due to transient outages like load balancing, Reconfiguration, planned maintenance, update SLO.


Action from customer: -

When your database experiences downtime, analysis is performed to determine a reason. When available, the downtime reason is reported in the Health History section of Resource Health. Downtime reasons are typically published within 45 minutes after an event.

Expected Downtime and Multiple health alerts: -

We expect SQL DB to be unreachable for upto 2 mins due to transient outages which can be caused due to one or combination of the following reasons: -

- resource load balancing
- Reconfiguration
- planned maintenance
- Unplanned Maintenance (OS and security patches)
- proxy throttling
- update SLO (customer initiated and administrative updates done by Azure capacity team).

99.99% SLA means upto 4.38 minutes of downtime per month. This SLA does not include monthly maintenance window that incurs a downtime to patch your server and infrastructure is excluded from the uptime calculation. More details and limitations on SLA can found [SLA for Azure SQL DB](#) 

Multiple Health Alerts

Due to the same reasons mentioned above customer would see multiple health alerts being fired in Resource Health Center and it should not be a cause of concern as long as the connections were successful in subsequent retries and overall outages was within 2 mins.

Troubleshooting RHC issues.

The best way to check availability issues on a database is to use LoginOutages and MonLogin Kusto tables along with ASC.

LoginOutages

```
let TimeCheckStart = datetime('2022-10-23 12:00:00');
let TimeCheckEnd = datetime('2022-11-21 12:50:00');
let ServerName = ('Server_Name');
//let DatabaseName = ('Database_Name');
LoginOutages
| where outageStartTime >= TimeCheckStart and outageEndTime <= TimeCheckEnd
| where logical_server_name =~ ServerName
| where database_name =~ DatabaseName
| project outageStartTime, outageEndTime, durationSeconds, database_name, OutageType, OutageReasonLevel1, OutageReasonLevel2
| order by outageStartTime desc
```

Sample Output

outageStartTime	outageEndTime	1 duration...	2 datab...	OutageType 2	OutageReasonLevel1 2	OutageReasonLevel2 4	OutageReasonLevel3	OwningTeam 6	CustomerReadyRcaText 5
2022-12-11 09:15:45.1290977	2022-12-11 09:15:51.7348727	6.61	sellerr...	Unplanned	Unknown	['sqlserver/40613/129 (FindLoginForContainedDBAuthUnexpected...	GeoRole: GeoPrimary		
2022-12-11 09:04:22.2871960	2022-12-11 09:04:37.2871960	15	sellerr...	Unplanned	Unknown	['xdtbhost/0/0 (Success)']	GeoRole: GeoPrimary		
2022-12-10 04:03:07.0107243	2022-12-10 04:03:10.5901564	3.58	sellerr...	Planned	Deployment	Upgrade		AZURESQLDB/SQLAzureDeploy...	Your database sellerrecommendationprod in businessmentor
2022-12-08 11:53:22.1629749	2022-12-08 11:53:22.2119749	0.05	master	Unplanned	Gateway alias issue				
2022-12-08 08:44:29.7258995	2022-12-08 08:44:38.9005801	9.17	sellerr...	ResourceBalancing	Update SLO	UpdateLogicalDatabase	RequestId: F90E2A1C-12D6-4D7A-9...	AZURESQLDB/SQLAzureProvision...	Your database sellerrecommendationprod in businessmentor
2022-12-08 04:51:35.9844974	2022-12-08 04:51:40.2341251	4.25	sellerr...	Planned	Deployment	Upgrade		AZURESQLDB/SQLAzureDeploy...	Your database sellerrecommendationprod in businessmentor
2022-10-30 07:53:32.4802686	2022-10-30 07:53:47.4802686	15	sellerr...	Unplanned	ProxyThrottled	TCPTimeoutToBackend	['OutageReason': 'FewNodesAffecte...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-27 03:07:32.1120047	2022-10-27 03:07:47.1120047	15	sellerr...	Unplanned	Unknown	['xdtbgateway/40613/22/0/10060 (DueToProxyConnexThrottle)']	GeoRole: GeoPrimary		
2022-10-26 01:41:37.5770420	2022-10-26 01:41:52.8026778	15.23	sellerr...	Unplanned	ProxyThrottled	TCPTimeoutToBackend	['OutageReason': 'SingleNodeAffect...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-26 00:28:31.2515072	2022-10-26 00:28:39.9581920	8.71	sellerr...	Unplanned	TediousDriverRedirected		['NodesAffected': '["TR1834_DB.32"]...		
2022-10-26 00:16:47.1676419	2022-10-26 00:16:52.3608085	5.19	sellerr...	Planned	Deployment	Upgrade		AZURESQLDB/SQLAzureDeploy...	Your database sellerrecommendationprod in businessmentor
2022-10-23 20:08:36.2088546	2022-10-23 20:08:51.2088546	15	sellerr...	Unplanned	Unknown	['xdtbgateway/40613/22/0/10060 (DueToProxyConnexThrottle)']	GeoRole: GeoPrimary		
2022-10-20 18:20:13.9246806	2022-10-20 18:20:28.9246806	15	sellerr...	Unplanned	ProxyThrottled	DispatcherLoadSpike	['DispatcherTaskCount': null, 'Nodes...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-20 18:18:29.6274566	2022-10-20 18:18:44.6274566	15	sellerr...	Unplanned	ProxyThrottled	DispatcherLoadSpike	['DispatcherTaskCount': null, 'Nodes...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-20 02:06:39.8618820	2022-10-20 02:06:54.8618820	15	sellerr...	Unplanned	Unknown	['xdtbgateway/40613/22/0/10060 (DueToProxyConnexThrottle)']	GeoRole: GeoPrimary		
2022-10-19 05:47:27.1294365	2022-10-19 05:47:44.4741426	17.34	sellerr...	Unplanned	ProxyThrottled	TCPTimeoutToBackend	['OutageReason': 'FewNodesAffecte...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-19 05:01:38.6770270	2022-10-19 05:02:14.7722855	36.1	sellerr...	Unplanned	Unknown	['xdtbgateway/26078/23/0/SERVICE_ENDPOINT (ProxyLoginDiscon...	GeoRole: GeoPrimary		
2022-10-17 20:35:17.6147892	2022-10-17 20:35:33.8844135	16.27	sellerr...	Unplanned	ProxyThrottled	DispatcherLoadSpike	['DispatcherTaskCount': null, 'Nodes...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-17 20:25:58.5823191	2022-10-17 20:26:36.8927586	38.31	sellerr...	Unplanned	ProxyThrottled	DispatcherLoadSpike	['DispatcherTaskCount': null, 'Nodes...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-17 13:00:12.6308541	2022-10-17 13:00:27.6308541	15	sellerr...	Unplanned	ProxyThrottled	TCPTimeoutToBackend	['OutageReason': 'FewNodesAffecte...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-16 10:50:11.3481535	2022-10-16 10:50:26.3481535	15	sellerr...	Unplanned	ProxyThrottled	TCPTimeoutToBackend	['OutageReason': 'MostNodesAffect...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-15 22:31:11.3091339	2022-10-15 22:31:26.3091339	15	sellerr...	Unplanned	ProxyThrottled	TCPTimeoutToBackend	['OutageReason': 'FewNodesAffecte...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-14 23:28:08.9588445	2022-10-14 23:28:46.0717982	37.11	sellerr...	Unplanned	ProxyThrottled	TCPTimeoutToBackend	['OutageReason': 'FewNodesAffecte...	AZURESQLDB/SQLAzureGateway	Your database sellerrecommendationprod in businessmentor
2022-10-14 18:10:00.2686154	2022-10-14 18:10:15.2686154	15	sellerr...	Unplanned	Unknown	['xdtbgateway/40613/22/0/10060 (DueToProxyConnexThrottle)']	GeoRole: GeoPrimary		

- 1- The duration column is important it points out how many secs the logins to DB were failing. We expect this to be less than 2 mins. In most cases it is few secs of outage and than logins are successful once the transient outages is over.
- 2 - This column points out whether the outage was planned or unplanned. In case cases customer might receive incorrect RHC alert and we can use verify Outage Type here
- 3 and 4 - This column shows the outage reason and details on outage.
- 5 In some cases, the RCA is shared in LoginOutages table under "Customer Ready RCA Text" and we can use this RCA to help address cx's concern.
- 6 This column points to the origin of issue and in case an ICM is needed ensure it routed to correct team to get efficient responses in timely manner.

MonLogin

```

let TimeCheckStart = datetime('2022-12-08 08:40:00');
let TimeCheckEnd = datetime('2022-12-08 09:10:00');
let ServerName = ('server_name');
let DatabaseName = ('database_name');
MonLogin
| where TIMESTAMP >= TimeCheckStart and TIMESTAMP <= TimeCheckEnd
| where server_name =~ ServerName or logical_server_name =~ ServerName or LogicalServerName =~ ServerName
| where database_name =~ DatabaseName
| where event =~ 'process_login_finish'
//| where error <> 0 and isnotempty(error)
| project originalEventTimestamp, NodeName ,AppName, subscription_id, SubscriptionId, application_name ,datab

```

Sample MonLogin Output

originalEventTimestamp	NodeName	AppName	SubscriptionId	database_name	peer_address	logical_server_name	LogicalServerName	package	event	is_user_error	error	state	code_package_version
2022-12-08 08:44:30.4856351	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.5169294	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.5434217	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.5679235	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.6848327	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:13b:6b23:200:a0ax	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.7191041	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:13b:6b23:200:a0ax	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.8324698	GW.28	Gateway	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbgateway	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.8364366	DB.2	e7bfb8eb136f9	de0aa232-c7a9-4337-96f2-5bb0671cf5a	SellerRecommendationPROD	10.102.73.x	businessmentor-prod-62612366	businessmentor-prod-62612366	sqlserver	process_login_finish	0	40613	129	16.0.816.9217-DB-b704a52
2022-12-08 08:44:30.9019021	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.9739809	GW.3	Gateway	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:13b:6b23:200:a0ax	businessmentor-prod-62612366	DummyValue	xdbgateway	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:30.9888269	DB.2	e7bfb8eb136f9	de0aa232-c7a9-4337-96f2-5bb0671cf5a	SellerRecommendationPROD	10.10.40.x	businessmentor-prod-62612366	businessmentor-prod-62612366	sqlserver	process_login_finish	0	40613	129	16.0.816.9217-DB-b704a52
2022-12-08 08:44:31.0654321	GW.69	Gateway	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:13b:6b23:200:a0ax	businessmentor-prod-62612366	DummyValue	xdbgateway	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.0726394	DB.2	e7bfb8eb136f9	de0aa232-c7a9-4337-96f2-5bb0671cf5a	SellerRecommendationPROD	10.10.40.x	businessmentor-prod-62612366	businessmentor-prod-62612366	sqlserver	process_login_finish	0	40613	129	16.0.816.9217-DB-b704a52
2022-12-08 08:44:31.1152600	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.2015491	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.3480523	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.3752255	GW.46	Gateway	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbgateway	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.3875427	DB.2	e7bfb8eb136f9	de0aa232-c7a9-4337-96f2-5bb0671cf5a	SellerRecommendationPROD	10.102.73.x	businessmentor-prod-62612366	businessmentor-prod-62612366	sqlserver	process_login_finish	0	40613	129	16.0.816.9217-DB-b704a52
2022-12-08 08:44:31.4244634	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:7ae0:6d23:100:a6...	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.4370072	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:13b:6b23:200:a0ax	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.4375325	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:13b:6b23:200:a0ax	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e
2022-12-08 08:44:31.4592316	DB.2	Worker	00000000-0000-0000-0000-000000000000	SellerRecommendationPROD	fd40:1c1823:13b:6b23:200:a0ax	businessmentor-prod-62612366	DummyValue	xdbhost	process_login_finish	0	0	0	16.0.816.9217-DB-0289b73e

Verify if logins were successful after the outage completed, in most cases you should see successful logins after the outage is over , the timestamps will coincide with timestamps from LoginOutage table.

Common downtime reasons from LoginOutage table

Update SLO

Some of the Update SLOs can be initiated by customer which will be a tier change. In some cases update slo is also Azure Capacity team to maintain load balancing on Azure backend.

RCA Your database "Input_database_name" in "Server-Name" was unavailable due to a scaling operation or service tier change. Initiating a scale up, or scale down action, in any of the flavors mentioned above, restarts the database engine process, and moves it to a different virtual machine if needed. Moving the database engine process to a new virtual machine is an online process during which you can continue using your existing Azure SQL Database service. Once the target database engine is ready to process queries, open connections to the current database engine will be terminated, and uncommitted transactions will be rolled back. New connections will be made to the target database engine. You can expect a short connection break when the scale up/scale down process is finished. If you have implemented Retry logic for standard transient errors, you will not notice the failover.

Recommended Reading - <https://learn.microsoft.com/en-us/azure/azure-sql/database/scale-resources?view=azuresql> 

Deployment

To keep Azure SQL Database secure, compliant, stable, and performant, updates are being performed through the service components almost continuously. With hot patching, majority of updates are fully transparent and non-impactful in terms of service availability. Still, few types of updates cause short service interrupts and require special treatment.

RCA Your database "Input_database_name" in "Server-Name" experienced failover due to planned maintenance. To ensure high quality of the service and safe execution environment, we roll out the upgrades on a monthly schedule. Typically, upgrade payload includes OS patches and security fixes, new SQL product features and repairs as well as most recent 3rd party bits. Planned failovers are almost always instantaneous and last at most a few seconds and should be handled using retry logic from your application.

Recommended Reading - <https://learn.microsoft.com/en-us/azure/azure-sql/database/planned-maintenance?view=azuresql> 

Proxy Throttled

Servers in SQL Database support the following three options for the server's connection policy setting.

- Redirect(recommended): Clients establish connections directly to the node hosting the database, leading to reduced latency and improved throughput.
- Proxy: In this mode, all connections are proxied via the Azure SQL Database gateways, leading to increased latency and reduced throughput. For connections to use this mode, clients need to allow outbound communication from the client to Azure SQL Database gateway IP addresses on port 1433.
- Default: This is the connection policy in effect on all servers after creation unless you explicitly alter the connection policy to either Proxy or Redirect. The default policy is Redirect for all client connections originating inside of Azure (for example, from an Azure Virtual Machine) and Proxy for all client connections originating outside (for example, connections from your local workstation).

RCA Your database "Input_database_name" in "Server-Name" experienced connection errors due to proxy throttling. By default, connections originating outside of the Azure network boundary will use the proxy method which will be a shared common endpoint for connecting to the database(s) in that region. If performance regressions are seen or heavy traffic from a client are seen, throttling can occur. Azure strongly recommends moving your connection policy from Proxy to Redirect to reduce these errors.

Recommended Reading - <https://learn.microsoft.com/en-us/azure/azure-sql/database/connectivity-architecture?view=azuresql#connection-policy> 

- Gateway alias issue(Master DB) *Recommended Reading* - https://supportability.visualstudio.com/AzureSQLDB/_wiki/wikis/AzureSQLDB.wiki/388344/Error-40613-State-84
- Long Login
- HighLatencyLogin

Root Cause Classification

Cases resolved by this TSG should be coded to the following root cause: <Connectivity: Troubleshoot DB Availability and Connection Errors\Resource Health events>

How good have you found this content?



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