Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com

In **SQL Server Always On** (both **Failover Cluster Instances** and **Availability Groups**), "wait types" are very useful for troubleshooting performance or failover issues because they show where SQL Server threads are spending time.

Here's a breakdown of **common wait types you'll see related to Always On** and what they typically mean:

1. Availability Group–Specific Wait Types

Wait Type	Meaning	Possible Causes / Notes
HADR_SYNC_COMMIT	Primary replica is waiting for synchronous commit acknowledgment from a synchronous secondary replica.	Network latency between replicas, slow disk on secondary, or high workload.
HADR_DATABASE_FLOW_CONTROL	Data movement is paused because the secondary is slow to consume log records.	Secondary I/O bottleneck, slow redo process, network congestion.
HADR_LOGCAPTURE_WAIT	Waiting for log blocks to be captured from the primary database log buffer.	Idle system, low workload, or log capture thread waiting for log records.
HADR_WORK_QUEUE	Thread is waiting for new Always On work (e.g., log send/redo).	Usually idle; can indicate AG activity lull.
HADR_REPLICA_COMMIT_WAIT	Secondary replica is waiting to commit a transaction received from the primary.	Slow transaction log writes on the secondary.
HADR_SYNC_RECEIVE	Waiting for data from the primary in synchronous mode.	Network delays or primary being slow in sending.
HADR_FILESTREAM_IOMGR_IOCOMPLETION	Waiting for FILESTREAM I/O completion in an AG.	Common if FILESTREAM is used with AG.

2. Cluster and Networking Wait Types

Wait Type	Meaning	Possible Causes
REPLICA_WRITE	Waiting for transaction log blocks to be sent to secondary.	Network latency, CPU pressure, or log send bottleneck.
REPLICA_READ	Waiting for incoming log blocks from primary.	Primary is slow sending, or network bottleneck.
DISTRIBUTED_AG	Waits specific to distributed availability groups (cross-cluster AGs).	WAN latency, distributed AG sync delays.

Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com

3. General Waits Common During Always On Troubleshooting

Even though these aren't AG-specific, they often surface during Always On performance analysis:

Wait Type	Meaning	Why It Matters for Always On
WRITELOG	Waiting for transaction log flush to disk.	If primary log writes are slow, synchronous secondaries will be impacted.
ASYNC_NETWORK_IO	Waiting to send results to a client or secondary.	Can indicate network latency in AG.
CXPACKET / CXCONSUMER	Parallel query waits.	High CPU queries can slow AG log processing.
PAGEIOLATCH_ *	Waiting for data pages from disk.	Slow disk I/O can impact AG sync if it affects redo/log operations.

✅ **Tip for Troubleshooting:**

You can query sys.dm_os_wait_stats and sys.dm_exec_requests to check real-time and accumulated waits related to Always On:

```
SELECT *
FROM sys.dm_os_wait_stats
WHERE wait_type LIKE 'HADR%';
```

```
SELECT session_id, wait_type, wait_time, blocking_session_id
FROM sys.dm_exec_requests
WHERE wait_type LIKE 'HADR%';
```

Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com

📌 SQL Server Always On Wait Types – Cheat Sheet

1. Always On–Specific Wait Types

Wait Type	Meaning	Common Causes	Quick Fix / Check
HADR_SYNC_COMMIT	Primary waits for synchronous secondary to confirm commit.	Network latency, slow secondary disk, high workload.	Check network RTT, monitor secondary log write speed, reduce sync replicas if not needed.
HADR_DATABASE_FLOW_CONTROL	Secondary is slow in applying log blocks, causing flow control pause.	Slow redo queue, slow secondary disk, high log generation rate.	Monitor redo queue in `sys.dm_hadr_database_replica_states`, tune disk, reduce workload bursts.
HADR_LOGCAPTURE_WAIT	Log capture thread idle, waiting for new log records.	Idle workload (normal) or long-running transactions delaying log truncation.	If abnormal, check for open transactions and log backup delays.
HADR_WORK_QUEUE	Worker thread idle waiting for tasks.	No work to process (normal).	Ignore unless AG is stuck — then check suspended databases.
HADR_REPLICA_COMMIT_WAIT	Secondary is committing transactions from primary.	Slow disk I/O on secondary log drive.	Check secondary transaction log latency (`WRITELOG` waits).
HADR_SYNC_RECEIVE	Secondary waiting for data from primary.	Network issues, primary not sending quickly.	Monitor network packet drops and primary AG send queue.
HADR_FILESTREAM_IOMGR_IOCOMPLETION	FILESTREAM I/O in AG.	Large FILESTREAM usage or slow FS storage.	Tune FILESTREAM storage.

2. Distributed Availability Group Wait Types

Wait Type	Meaning	Common Causes	Quick Fix / Check
HADR_TRANSPORT_DAG	Data transfer in distributed AG.	WAN latency, slow send queue.	Optimize WAN, compress traffic, schedule workloads.
DAG_SEND / DAG_RECEIVE	Sending/receiving log data between AGs.	WAN bandwidth limits, packet loss.	Monitor throughput, QoS adjustments.

Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com

3. Related General Wait Types (Impacting AG Performance)

Wait Type	Meaning	Why It Matters	Quick Fix / Check
WRITELOG	Wait for log flush to disk.	Affects commit time in synchronous AG.	Optimize log drive I/O (separate LUN, SSD).
ASYNC_NETWORK_IO	Waiting to send results to client or replica.	Network bottleneck.	Check NICs, packet drops, jumbo frames.
PAGEIOLATCH_ *	Wait for data from disk.	Slow reads can delay redo in secondary.	Tune storage, check I/O queues.
CXPACKET / CXCONSUMER	Parallel query waits.	CPU bottlenecks may delay log send/redo.	Review parallelism settings.

4. Quick DMVs for Investigation

```
-- Wait stats for AG
SELECT *
FROM sys.dm_os_wait_stats
WHERE wait_type LIKE 'HADR%';

-- Real-time AG waits
SELECT session_id, wait_type, wait_time, blocking_session_id
FROM sys.dm_exec_requests
WHERE wait_type LIKE 'HADR%';

-- Redo & send queue sizes
SELECT database_id, redo_queue_size, log_send_queue_size
FROM sys.dm_hadr_database_replica_states;
```

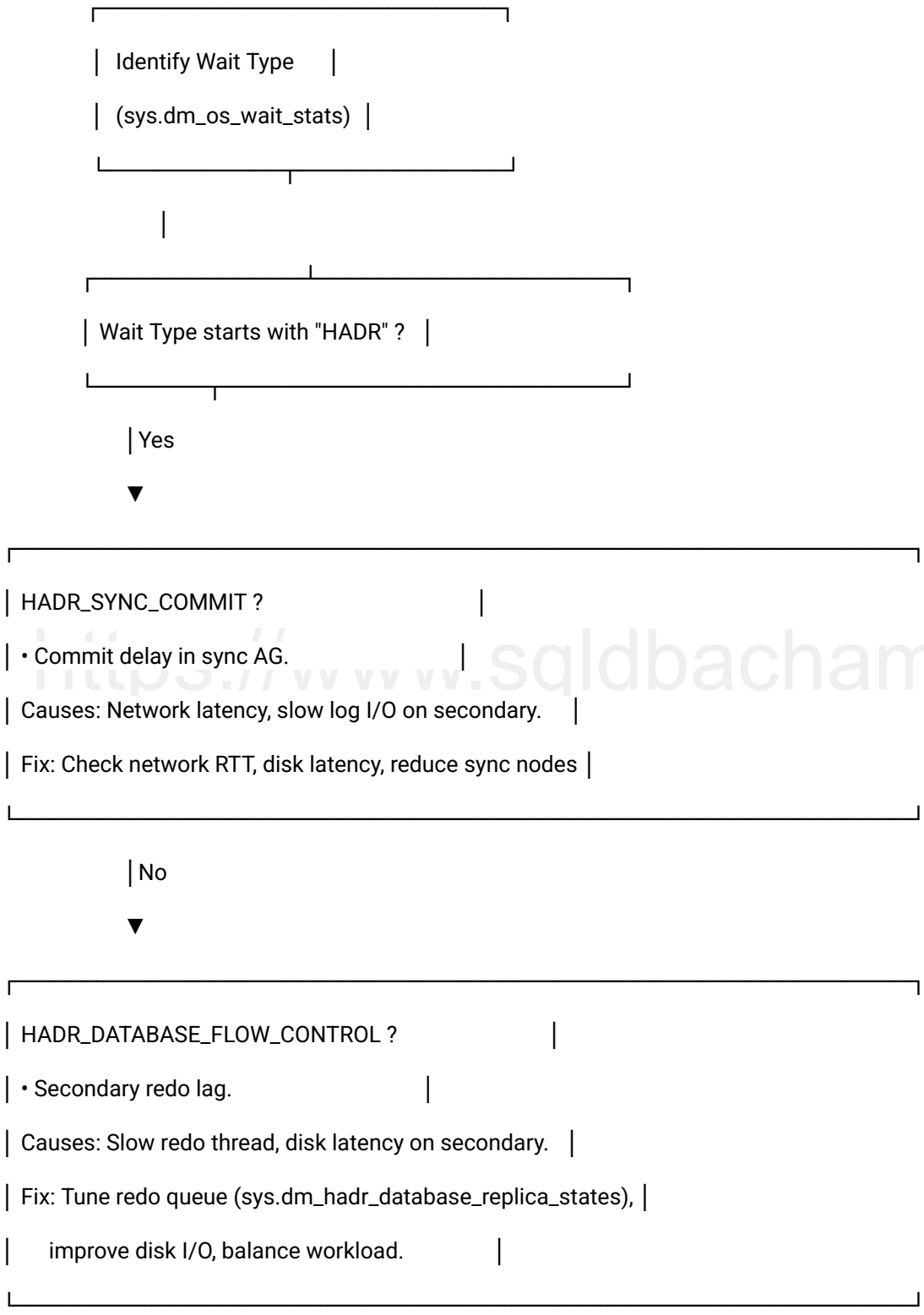

💡 **Interview Tip:**

If asked “Which wait type indicates synchronous AG commit delays?” → **HADR_SYNC_COMMIT**.

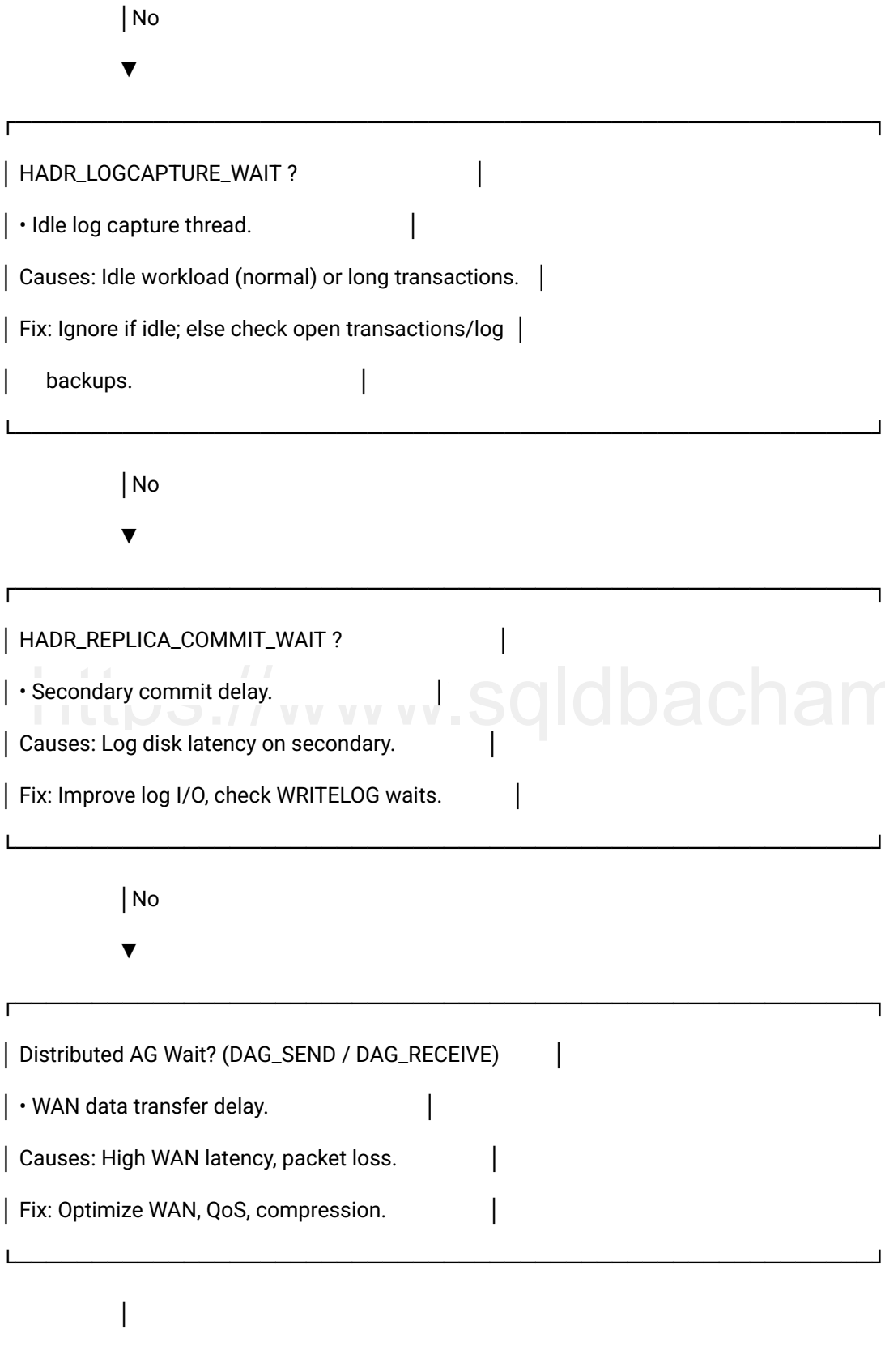
If asked “Which wait type indicates secondary redo lag?” → **HADR_DATABASE_FLOW_CONTROL**.

Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com

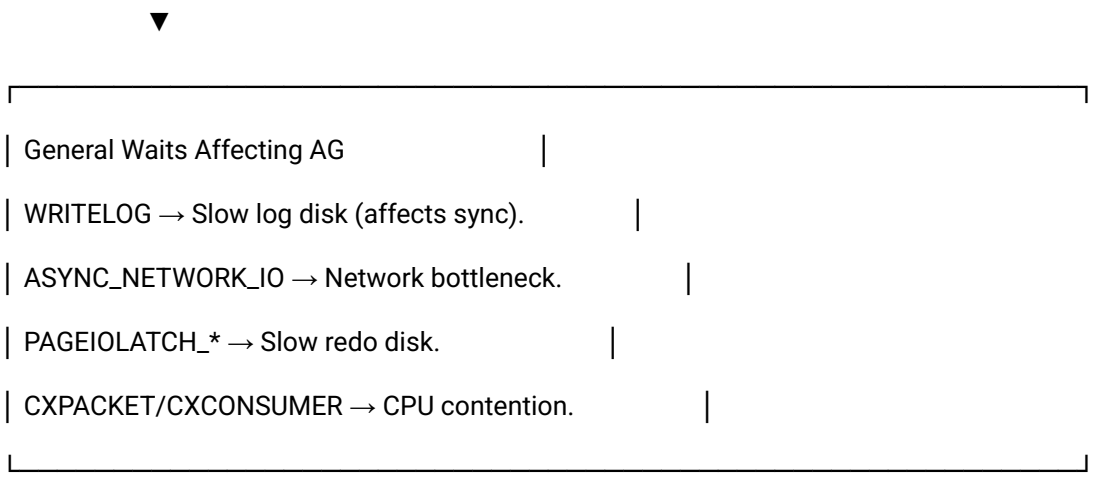
SQL Server Always On Wait Type Troubleshooting Flowchart



Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com



Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com



Usage in Troubleshooting:

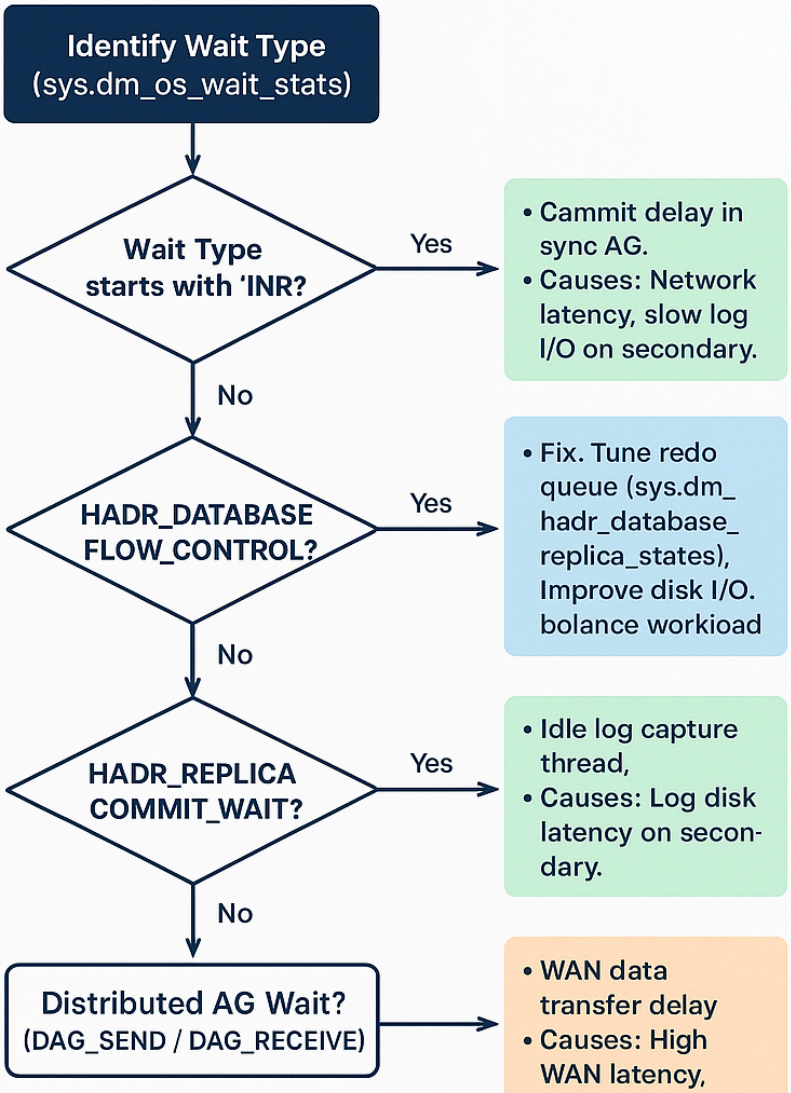
1. Run:

```
SELECT wait_type, wait_time_ms
FROM sys.dm_os_wait_stats
WHERE wait_type LIKE 'HADR%';
```


2. Follow the flowchart from **top** → **down** to identify the cause.
3. Apply targeted fix based on cause.

Praveen Madupu
Mb: +91 98661 30093
Sr. Database Administrator
praveensqldba12@gmail.com

SQL Server Always On Wait Type Troubleshooting Flowchart



General Waits Affecting AG

- WRITELOG → Slow log disk (affects sync)
- ASYNC_NETWORK_IO → Network bottleneck
- PAGEIOLATCH_* → Slow redo disk
- CXPACKET / CXCONSUMER → CPU contention