PGA Analysis in AWR Report

Unlike **SGA**, which has dedicated AWR sections, **PGA memory analysis must be inferred** from multiple sections.

✅ **Valid AWR Sections for PGA Analysis**

1. **Instance Activity Statistics** → Tracks **PGA-related memory usage**
2. **Time Model Statistics** → Helps analyze **SQL execution delays due to memory pressure**
3. **Top 10 Foreground Events by Total Wait Time** → Identifies **PGA-related waits (IF they exist)**
4. **Tablespace I/O Stats** → Confirms **TEMP tablespace overuse if PGA is insufficient**

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1. Instance Activity Statistics (Valid PGA Metrics in AWR)

📍 **Location in AWR:** *Instance Activity Statistics Section*

📍 **Purpose:**

- Tracks **PGA memory usage** and **workarea execution efficiency.**
- Determines if queries are executing **fully in PGA memory or spilling to TEMP tablespace.**

✅ **Valid PGA-Related Metrics in AWR:**

Statistic Name	Example Value	What It Means
workarea executions - optimal	900,000	Queries **mostly using PGA memory** (good).
workarea executions - onepass	100,000	Queries **using TEMP tablespace (moderate use).**

🔎 **How to Analyze:**

- **If "onepass" executions are high**, it indicates **PGA is insufficient**, and some sorting is spilling to TEMP.
  Fix: Increase pga_aggregate_target or optimize **sort and join operations**.

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2. Time Model Statistics (PGA Impact on SQL Execution)

📍 **Location in AWR:** *Time Model Statistics Section*

📍 **Purpose:**

- Breaks down **total database processing time** into various activities.
- Helps determine if **queries are waiting due to PGA memory pressure.**

✅ **Valid Metrics in AWR for PGA:**

Statistic Name	Example Value	What It Means
DB time	5,000 sec	Total time spent processing queries.
DB CPU time	3,000 sec	Time spent on computation (not I/O).
sql execute elapsed time	4,500 sec	Total time spent running SQL.

🔎 **How to Analyze:**

- If **SQL Execution Time** is **very high**, but **CPU time is low**, queries may be waiting for **PGA allocation or disk I/O.**
- If **DB CPU is low but SQL Execute Time is high**, check **TEMP tablespace usage** for PGA spills.

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3. Top 10 Foreground Events by Total Wait Time (PGA-Related Waits - IF Present)

📍 **Location in AWR:** *Top 10 Foreground Events by Total Wait Time Section*

📍 **Purpose:**

- Identifies **the top wait events impacting performance**.
- If PGA is under pressure, waits like **"direct path read temp"** or **"direct path write temp"** may appear.

✅ **PGA-Related Wait Events in AWR (IF they exist):**

Wait Event	Wait Time (s)	What It Means
direct path read temp	500 sec	Queries reading from TEMP (PGA too small)
direct path write temp	300 sec	Queries writing intermediate results to disk

🚫 **Important:**

- **If "direct path read temp" or "direct path write temp" is NOT in the Top 10, it means PGA is likely sufficient.**
- These wait events **only appear if TEMP tablespace is heavily used due to insufficient PGA.**

🔎 **How to Analyze:**

- **If "direct path read temp" or "direct path write temp" appears**, it confirms that **PGA is insufficient, and queries are spilling to TEMP.**
  Fix: Increase pga_aggregate_target, **optimize SQL joins, and reduce sorts.**

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4. Tablespace I/O Stats (TEMP Tablespace Impact)

📍 **Location in AWR:** *Tablespace I/O Stats Section*

📍 **Purpose:**

- If **PGA is insufficient**, Oracle spills intermediate query results to **TEMP tablespace**.
- This section helps confirm **how much sorting & hashing is happening on disk.**

✅ **Valid Metrics in AWR for TEMP Usage (PGA Impact):**

Tablespace Name	Total Reads	Total Writes	Read Latency (ms)	Write Latency (ms)
TEMP	5,000,000	3,000,000	10 ms	15 ms

🚫 **Important:**

- **TEMP tablespace reads/writes DO NOT always indicate PGA pressure.**
- High TEMP usage **could also be due to large hash joins or sorts in queries.**

🔎 **How to Analyze:**

- If TEMP reads/writes are **very high**, PGA is **too low, forcing disk sorts.**
  Fix: Increase pga_aggregate_target and optimize queries.
- If **Write Latency > 10ms**, TEMP tablespace **might be on slow storage**.

🚀 Final Summary – Ways to Analyze PGA in AWR

AWR Section	Key Metrics	What to Look For	Fix
Instance Activity Statistics	workarea executions (optimal vs. onepass)	High Onepass → TEMP tablespace overuse	Tune queries, increase PGA
Time Model Statistics	sql execute time vs. DB CPU time	SQL execution too long? Check PGA usage	Tune queries, check TEMP usage
Top 10 Foreground Events	direct path read temp, direct path write temp (IF PRESENT)	If high → Excessive sorting to disk	Increase PGA, optimize indexes
Tablespace I/O Stats	TEMP reads/writes, latency	High reads/writes? → PGA is insufficient	Optimize SQL, move TEMP to SSD

🚀 Final Takeaways

✓ **PGA analysis must be done across multiple AWR sections**, including:

✅ **Instance Activity Statistics** → Tracks **workarea executions (optimal vs. onepass).**

✅ **Time Model Statistics** → Identifies **slow SQL execution due to memory pressure.**

✅ **Top 10 Foreground Events** → **IF "direct path read temp" appears, PGA is low.**

✅ **Tablespace I/O Stats** → **High TEMP usage confirms PGA pressure.**