

ORACLE

Oracle Database In-Memory

AskTOM Office Hours, In-Memory Hybrid Queries

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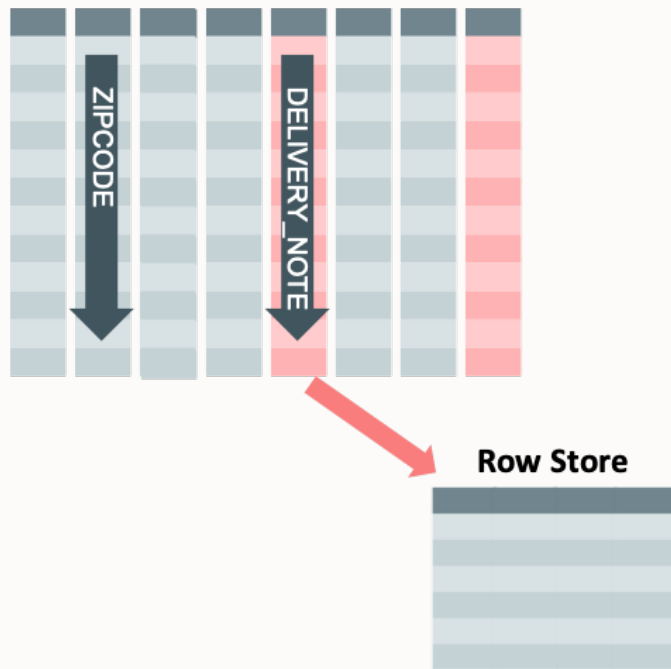
Director of Development, Data and Space



What If You Don't Have Enough Memory?

Columns Can Be Excluded

```
ALTER TABLE sales INMEMORY  
NO INMEMORY (delivery_note) ;
```

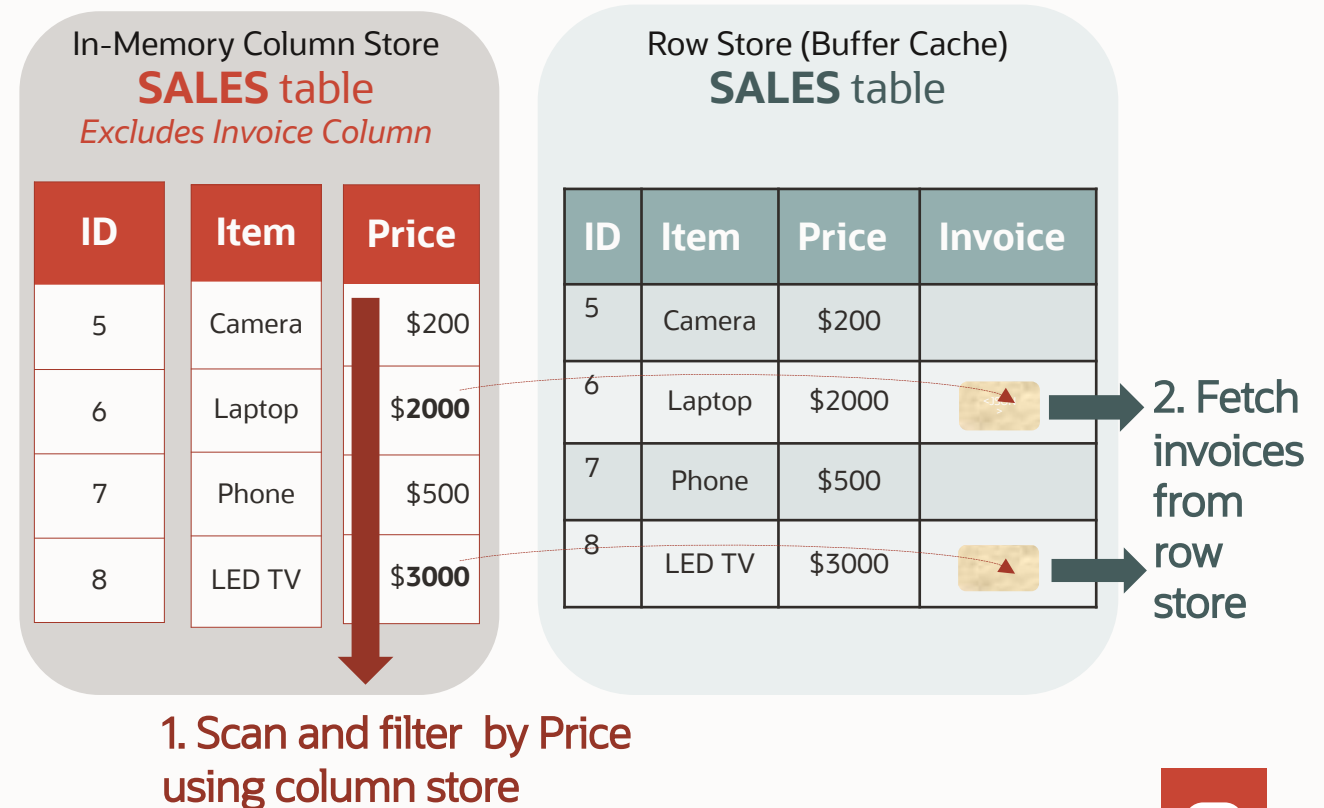


- You don't have to populate all columns
 - If excluded columns are accessed then the query will run against the row-store
 - In 21c, In-Memory Hybrid Scans supports both in-memory scans and row-store access for excluded projection columns
- Two phase approach
 1. INMEMORY attribute on table automatically inherited by columns
 2. Need to remove attribute from the columns you don't want populated

In-Memory Hybrid Scans (21c)

- Large, infrequently accessed columns can be excluded from the in-memory column store
 - e.g. Images, Documents, etc.
- Previous behavior: In-Memory access disallowed if query accesses any excluded column
- In-Memory **Hybrid** Scans
 - Scan/filter using in-memory column store
 - Fetch excluded column values from row store
 - Significant performance improvement over a pure row-store query

```
SELECT Invoice FROM Sales  
WHERE Price > 1000
```



In-Memory Hybrid Scan Example Query

```
select sum(lo_revenue)
from lineorder
where lo_orderdate = '19960102'
      and lo_quantity > 40
      and lo_shipmode = 'AIR';
```

LINEORDER Population – All Columns

```
alter table lineorder inmemory priority high;
```

OWNER	NAME	STATUS	Disk Size	In-Memory	Bytes
				Size	Not Populated
SSB	LINEORDER	COMPLETED	3,693,232,128	3,245,342,720	0



LINEORDER Population – Excluded Columns

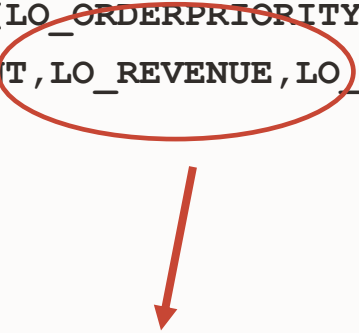
```
alter table lineorder inmemory priority high
no inmemory (LO_ORDERPRIORITY,LO_SHIPPRIORITY,LO_EXTENDEDPRICE,LO_ORDTOTALPRICE,
LO_DISCOUNT,LO_REVENUE,LO_SUPPLYCOST,LO_TAX,LO_COMMITDATE) ;
```

OWNER	NAME	STATUS	Disk Size	In-Memory	Bytes
				Size	Not Populated
SSB	LINEORDER	COMPLETED	3,693,232,128	1,509,949,440	0



In-Memory Hybrid Scan Example

```
alter table lineorder inmemory priority high  
no inmemory (LO_ORDERPRIORITY,LO_SHIPPRIORITY,LO_EXTENDEDPRICE,LO_ORDTOTALPRICE,  
LO_DISCOUNT,LO_REVENUE,LO_SUPPLYCOST,LO_TAX,LO_COMMITDATE) ;
```



```
select sum(lo_revenue)  
from lineorder  
where lo_orderdate = '19960102'  
and lo_quantity > 40  
and lo_shipmode = 'AIR' ;
```


In-Memory Hybrid Scan Execution Plan

How you can tell it was used?

- Exposed in the execution plan:

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time	TQ	IN-OUT	PQ Distrib
0	SELECT STATEMENT				68412 (100)				
1	SORT AGGREGATE		1	26					
2	PX COORDINATOR								
3	PX SEND QC (RANDOM)	:TQ10000	1	26			Q1,00	P->S	QC (RAND)
4	SORT AGGREGATE		1	26			Q1,00	PCWP	
5	PX BLOCK ITERATOR		749	19474	68412 (1)	00:00:03	Q1,00	PCWC	
* 6	TABLE ACCESS INMEMORY FULL (HYBRID)	LINEORDER	749	19474	68412 (1)	00:00:03	Q1,00	PCWP	



In-Memory Hybrid Scans Demo

Where Can You Get More Information?

Additional Database In-Memory Hybrid Scans Information

- Previous Ask TOM Sessions:
 - Database In-Memory 21c New Features
- Database In-Memory Documentation
 - In-Memory Guide

https://blogs.oracle.com/in-memory/dbim-resources

