



Why not Oracle SE2

Oracle Standard Edition 2

- Neglected young brother of Enterprise Edition
- Same as EE at the core
- Robust Disaster Recovery environment
- High Availability Solutions
(RAC up to 18c, Oracle Clusterware active/passive)
- Backup and Recovery Solutions
- License cost
- PostgreSQL?

Make IT

2024

Why not Oracle Standard Edition 2?

Boris Oblak
Abakus plus d.o.o.

ORACLE | CERTIFIED
PROFESSIONAL

ORACLE Gold
Partner

Specialized
Oracle Database

Abakus Plus d.o.o.

- History
 - From 1992
 - ~20 employees
- DBA Applications
 - ♠ DeJaVu
 - ♠ ARBITER
 - ♠ APPM
- Enterprise Applications
 - ♠ Document Management
 - ♠ Newspaper Distribution
 - ♠ Flight Information System
- Services
 - OS & Network admin
 - DBA, Programming
- Infrastructure
 - > 20 years of experience with High Availability on GNU/Linux
- Hardware
 - Servers, SAN, Ceph,
 - Firewalls,
 - Backup Server

Abakus and Oracle

- Oracle Database on Linux
 - **Abakus: 1995**
(Oracle 7.1.5, Forms 3.0)
 - Oracle: 1997
- Parallel execution
 - **Abakus: 2004**
(SIOUG 2004: Vzporedno Izvajanje operacij s PL/SQL – Boris Oblak)
 - Oracle: 2007
dbms_parallel_execute

APPMM

Abakus Plus
Performance
Monitor



- For Oracle Database Standard Edition
- Made by DBAs for DBAs
- Temporal performance comparison
- Resource allocation optimization
- Database performance tracking
- Performance bottleneck optimization

Backup server

supports Oracle Databases and OLVM VMs



- **Backup**
takes no time
- **Recovery**
data recovery is almost instant
- **Disk space**
backed up data takes up minimal amount of disk space
- **Availability**
data is always available and always in view
- **Security**
backed up data can not be deleted without support personnel intervention
- **Alternative uses**
BI analysis / reporting / DB upgrade verification / R&D testing / seamless business continuation



Deja Vu virtual databases

Data at your service.

dejavu

References

Gorenjska Banka

GENERALI
Zavarovalnica

Ljubljana Airport

Iskra



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA OBRAMBO

NOVA
BANKA

MILENIJUM®
OSIGURANJE

DRINA
OSIGURANJE

KONTROLA
ZRAČNEGA
PROMETA
SLOVENIJE

Horia



Mestna občina
Ljubljana

skbbanka
otp group

triglav

ANDRITZ

jata emona
LJUBLJANA



UNIVERZITETNA PSIHIATRIČNA
KLINIKA LJUBLJANA
University Psychiatric Clinic Ljubljana

BANKA
SLOVENIJE

EKDIS
Ekspresno. Ekonomično.

SAVA
INFOND

MERKUR

TRELLEBORG

SODO

SISTEMSKI OPERATER
DISTRIBUCIJSKEGA OMREŽJA Z
ELEKTRIČNO ENERGIJO

Trelleborg Slovenija, d.o.o.

NLB Vita
Življenjska zavarovalnica

PRVA

PEST MANAGEMENT SOLUTIONS

MAGNETIK d.o.o.

Mercator

MM
KARTON



Blubit

Tiko
TOVARNA KOVINSKE OPREME

ZAVOD ZA
ŠPORT RS
PLANICA

PH Primorska
hranilnica

GOODYEAR DUNLOP
SAVA TIRES

MM
KARTON



Blubit

Tiko
TOVARNA KOVINSKE OPREME

SAVA

HOTELS & RESORTS

CENTROSINERGIJA

PANTEON
GROUP

NFOTRANS

PRONET
CHOOSE THE FUTURE

hit alpinea
Kranjska Gora

LASERLINE

ORACLE

ROS d.o.o.

STUDENAC MARKET

PARK
POSTOJNSKA
JAMA



ADRIA ANKARAN
HOTEL & RESORT

AS
Abakus
As na disku.

dejavu Data at your service.

Oracle Database Editions

- Express Edition (XE)
- Personal Edition
- Standard Edition 2 (SE2)
- Enterprise Edition (EE)
- Oracle Database 23ai Free

Express Edition (XE)

- Free to download and use
- Enterprise features
- 2 cores
- 12 GB of user data
- 2 GB of Memory
- One installation per logical environment
- <https://docs.oracle.com/en/database/oracle/oracle-database/23/xein/licensing-restrictions.html>

Personal Edition

- Enterprise features (without RAC and management packs)
- Single user license
- Development and deployment
 - Oracle Database Free?

Oracle Database Free

- Oracle Database 23ai.
- Developer edition.
- Enterprise features.
- Up to 2GB of RAM.
- Up to 12GB of user data.
- <https://www.oracle.com/database/free/>

Standard Edition 2 (SE2)

- Servers with maximum capacity of 2 CPU sockets
- No limit to number of cores
 - Automatically limits CPU threads to 16
- RAC up to 18c
- From 19c:
 - Oracle Clusterware (free)
 - Active/passive cluster - failover to the second node

Enterprise Edition (EE)

- No limits
- Additional licenses (at additional costs)
- Some of additional licenses:
 - Oracle RAC
 - Partitioning
 - Performance Tuning Pack
 - Diagnostic pack
 - ...

Compare some features

Feature	SE2	EE
Maximum CPUs	2 CPU Sockets	No Limit
High Availability	YES RAC up to 18c, Active/Passive cluster with Oracle Linux and Oracle Clusterware	YES RAC Extra License Cost Option
Oracle Data Guard	NO ♠ Abakus Backup Server	YES Active Data Guard requires additional license
Flashback Data Archive	NO	YES
Flashback (Table, Database, Transaction)	NO	YES
Parallel options (Parallel Query, Stats, Index Building, Data Pump)	NO	YES
Automatic Workload Repositories	NO Statspack, ♠ Abakus APPM	YES Extra License Cost Option ♠ Abakus APPM
Diagnostic Pack	NO ♠ Abakus APPM	YES Extra License Cost Option
Recovery Manager	YES	YES

SE2 Key Features

- **Affordable Pricing**
- Core Database Functionality
- High Available Options
- Backup And Recovery
- Limited CPU Sockets
- No size limits

License Cost Comparison

- Processor: 1 socket, 16 cores
- Ram: 512 GB
- Storage: 20TB
- <https://shop.oracle.com> (2. 5. 2024)

Standard Edition 2	Enterprise Edition
1 Socket License 17.500 \$ First Year Support: 3.850 \$ Total Cost: 21.350 \$	8 Processor License (16 * 0,5) 47.500 \$ * 8 = 380.000 \$ First Year Support: 10.450 * 8 = 83.600 Total Cost: 463,600 \$

Standby Databases

- Can be implemented
- Using custom scripts
- No Data Guard
- Manual archive log shipping
- Recover standby database from service
- ♠ Abakus Backup Server

Flashback Database

- EE feature.
 - Flashback database on PROD?
 - Upgrade ...
 - DEV and TEST databases

Flashback Database

- EE feature.
 - Flashback database on PROD?
 - Upgrade ...
 - DEV and TEST databases
- ♠ Abakus Deja Vu:
 - DEV and TEST databases
 - create restore point
 - flashback database to restore point
 - upgrade test

Backup and Recovery

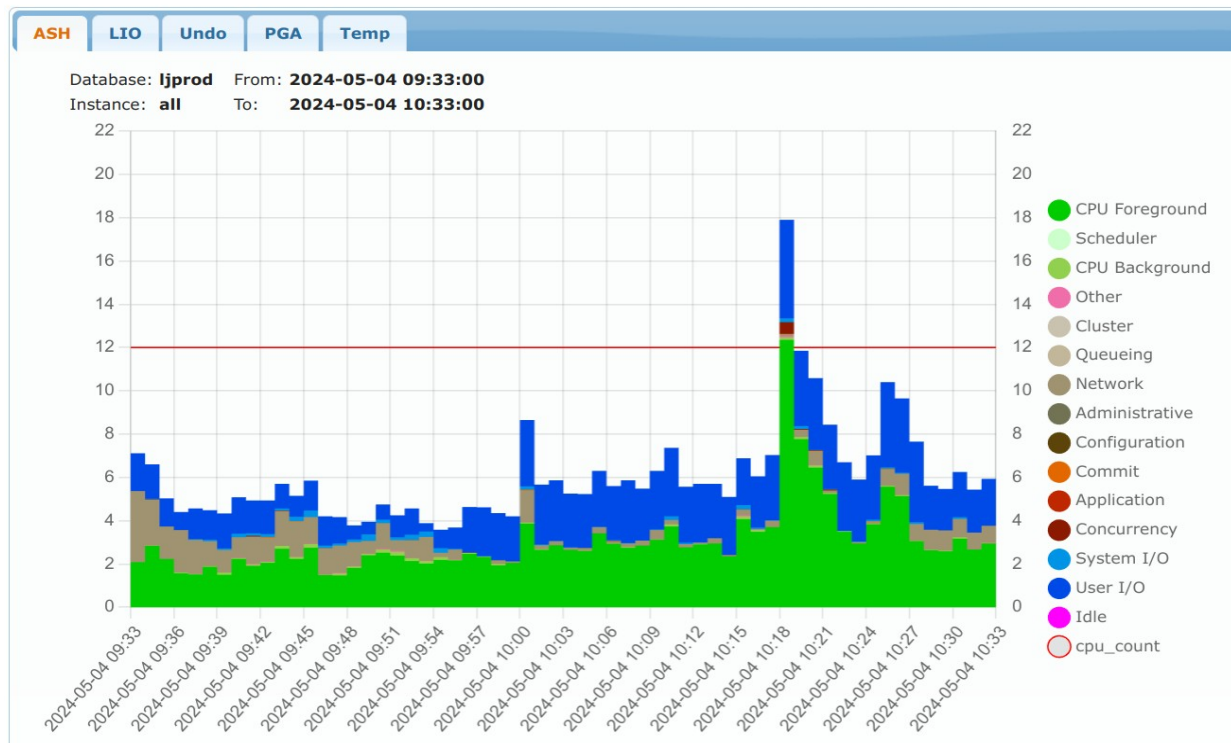
- RMAN
 - No parallel backup
 - No change block tracking
- Core functionality is available including incremental and incremental updatable backup

Active Session History (ASH)

- v\$active_session_history
 - Not available
 - Diagnostic pack (EE additional license cost)

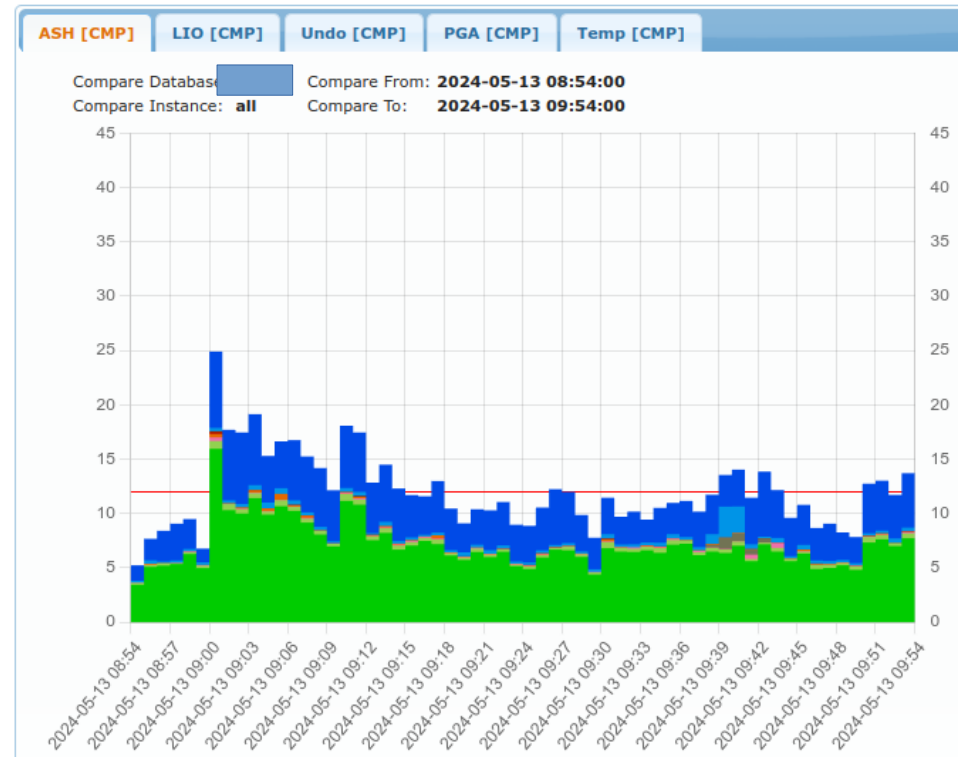
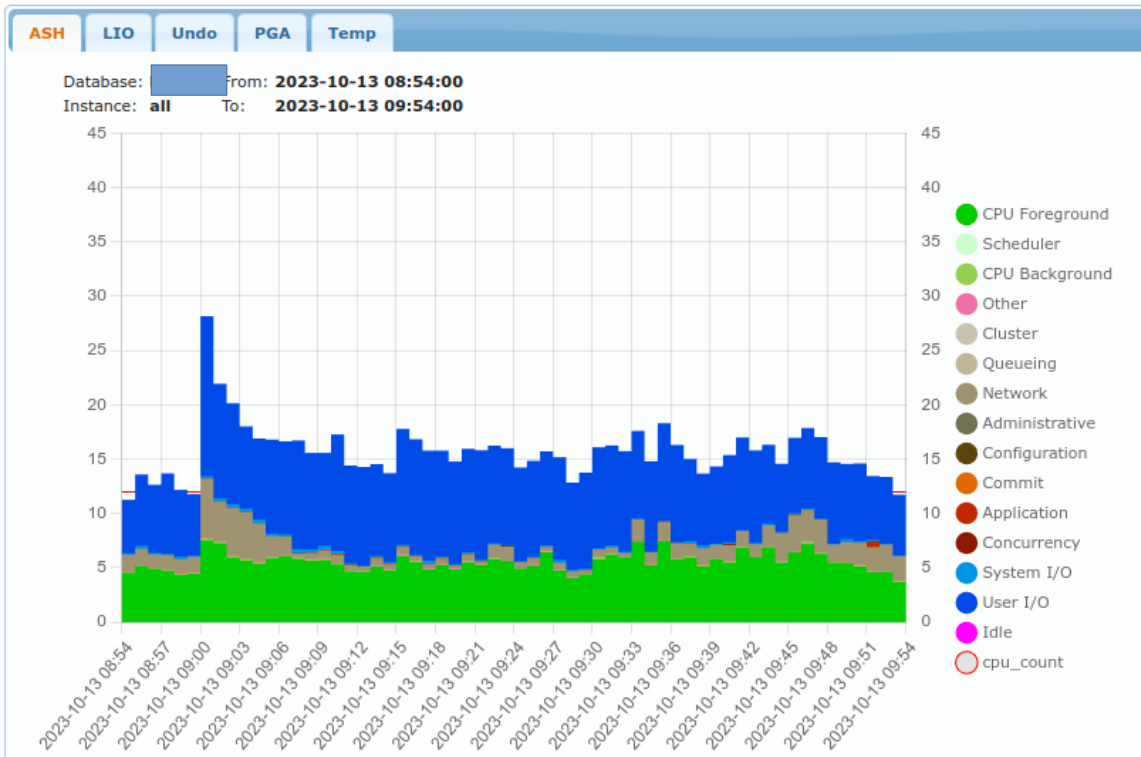
Active Session History (ASH)

- v\$active_session_history
 - Not available
 - Diagnostic pack (EE additional license cost)
- ♠ ABAKUS APPM:



Top Table	
Activity	Session ID
	1.330.20240504090001
	1.309.20240504061456
	1.1177.20240504095551
	1.1159.20240504095551
	1.1029.20240504101556
	1.180.20240504100003
	1.49.20240504085645
	1.157.20240504093306
	1.1320.20240504094232
	1.27.20240504101434

APPM – compare SQL



Performance stability

- SQL Profiles (EE)
- SQL Patch (EE and SE2)
- SQL Baseline

SQL Profiles (EE)

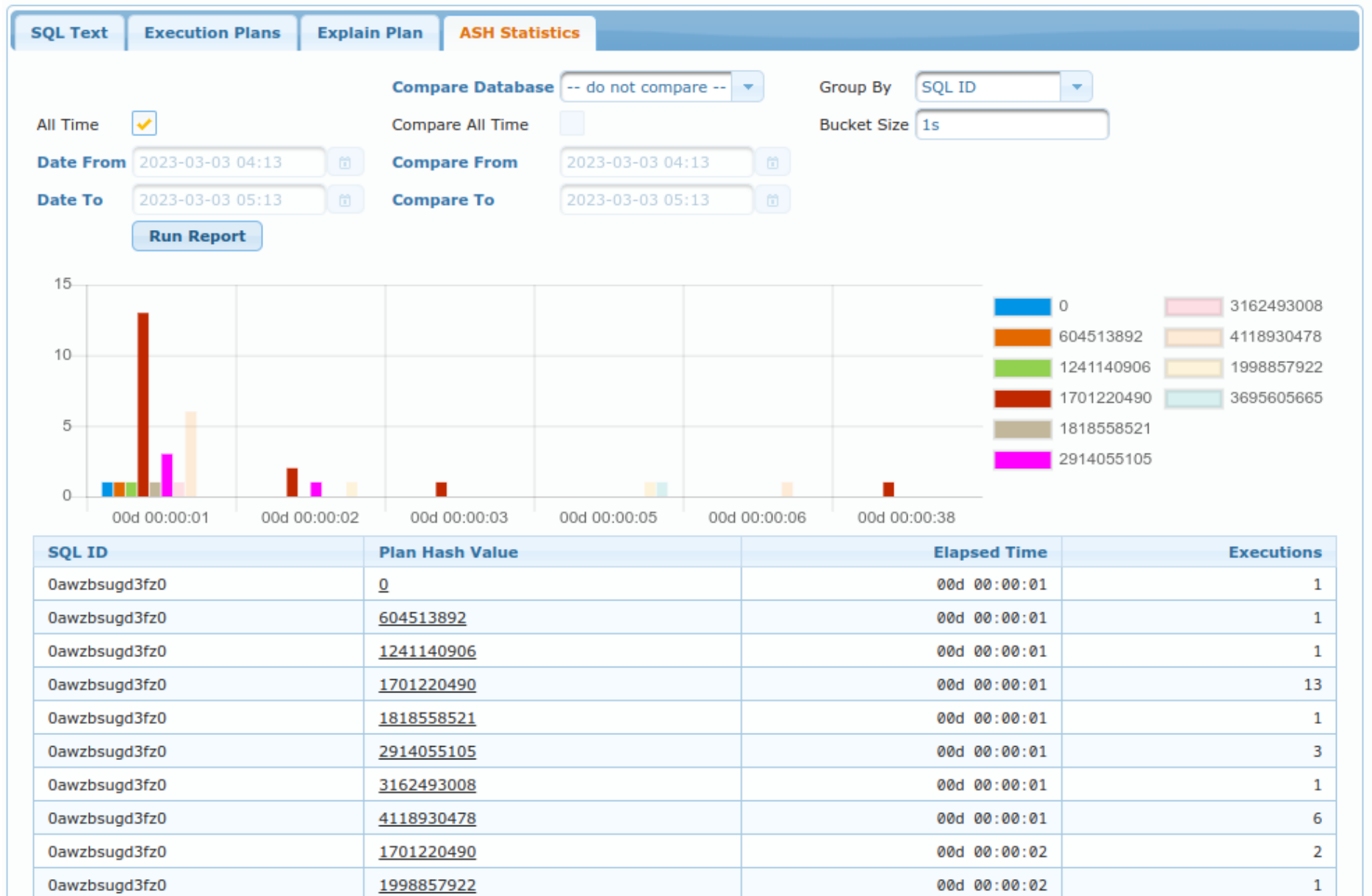
- Hints, attached to SQL statement
- Generally OPT_ESTIMATE (to change cardinality of the join predicate or column correlation)
- SQL Profiles are more or less statistics
- They go stale; not as easy to update as statistics
- Require the SQL Tuning License
- Not available in Standard Edition

SQL Patches

- Inject hints into a SQL statement
- 11g, 12.1:
 - `sys.dbms_sqldiag_internal.i_create_patch`
 - `hint_text` is limited to 500 bytes
- Do not require the SQL Tuning License
- Available in SE
- => 12.2: it's official and not internal function:
 - `dbms_sqldiag.create_sql_patch`
 - `hint_text` is CLOB
- ♠ Abakus APPM



APPM – execution histogram





APPM – copy Outline data

```
32 - access("C"."CLIENT_ID"="U"."CLIENT_ID" AND "C"."EVENT_INDEX"="U"."EVENT_INDEX")
34 - access("E"."EVENT_CODE"=:SYS_B_4)
36 - access("R"."DOCUMENT_LOG_ID"="V"."R_DOCUMENT_LOG_ID")
38 - access("T"."EVENT_CODE"="E"."EVENT_CODE" AND "T"."LANGUAGE_ID"='s1')
```

Outline Data:

```
-----
IGNORE_OPTIM_EMBEDDED_HINTS
OPTIMIZER_FEATURES_ENABLE('19.1.0.1')
DB_VERSION('19.1.0')
OPT_PARAM('optimizer_index_cost_adj' 1)
OUTLINE_LEAF(@"SEL$12")
OUTLINE_LEAF(@"SEL$13")
OUTLINE_LEAF(@"SEL$14")
OUTLINE_LEAF(@"SEL$15")
OUTLINE_LEAF(@"SEL$16")
OUTLINE_LEAF(@"SEL$17")
OUTLINE_LEAF(@"SEL$18")
OUTLINE_LEAF(@"SEL$19")
OUTLINE_LEAF(@"SEL$20")
OUTLINE_LEAF(@"SEL$9CF6F02A")
OUTER_JOIN_TO_INNER(@"SEL$7819791E" "D"@"SEL$7")
OUTLINE_LEAF(@"SEL$2")
OUTLINE_LEAF(@"SEL$1")
OUTLINE(@"SEL$7819791E")
MERGE(@"SEL$D92356A4" >"SEL$3")
OUTLINE(@"SEL$3")
OUTLINE(@"SEL$D92356A4")
MERGE(@"SEL$CD984B4F" >"SEL$762AFD21")
OUTLINE(@"SEL$762AFD21")
ANSI_REARCH(@"SEL$11")
OUTLINE(@"SEL$CD984B4F")
MERGE(@"SEL$2CEFF71B" >"SEL$A097D3F3")
OUTLINE(@"SEL$11")
OUTLINE(@"SEL$A097D3F3")
ANSI_REARCH(@"SEL$0299E20D")
```



APPM – Create SQL Patch

Create SQL Patch

SQL ID **0awzbsugd3fz0**
Patch Name auto generated

Patch Hint

```
IGNORE_OPTIM_EMBEDDED_HINTS
OPTIMIZER_FEATURES_ENABLE('19.1.0.1')
DB_VERSION('19.1.0')
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OUTLINE_LEAF(@"SEL$12")
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MERGE(@"SEL$2CEFF71B" > "SEL$A097D3F3")
```

[Disable block input](#)

Create SQL Patch

SQL Baselines

- => 11g: SQL Plan Management (SPM) (EE)
 - Each SQL_ID can have more than one plan
 - If better plan comes along, it can be captured; it will not be used unless we say that's OK
 - Evolve plans (allow optimizer to select best plan from defined list)
- >= 18c: SPM is in Standard Edition

SQL Baselines (SE2)

- SQL Plan Management does not require a license for Oracle Diagnostics Pack or Oracle Tuning Pack
- SE2 and DBCS SE Summary: Only one SQL plan baseline per SQL statement is allowed and SQL plan evolution is disabled
- SE2 and DBCS SE Details:
 - SQL plan baselines can be created or captured using the following methods:
 - Auto capture
(OPTIMIZER_CAPTURE_SQL_PLAN_BASELINE=TRUE)
 - Manual loading from the cursor cache
(DBMS_SPM.LOAD_PLANS_FROM_CURSOR_CACHE)
 - Migration from stored outlines
(DBMS_SPM.MIGRATE_STORED_OUTLINE)
 - Import using DBMS_SPM.UNPACK_STGTAB_BASELINE
- <https://docs.oracle.com/en/database/oracle/oracle-database/19/dblic/index.html>

Installing Oracle 19c SE2

- One binary for EE and SE2
- Advanced configuration
- Custom database
 - Other options installs EE features!
- Maximum 3 pluggable databases
- Database components:
 - Oracle Label Security and Oracle Database Vault are EE options!

Installing Oracle 19c SE2

- Initialization parameters:
 - `control_management_pack = NONE`
 - `deferred_segment_creation = FALSE`
 - `job_queue_processes = 0`
 - `optimizer_adaptive_plans = FALSE`
 - `optimizer_adaptive_statistics = FALSE`
 - `parallel_max_servers = 0`
 - do not use 'parallel' hints!
 - `resource_limit = FALSE`
 - Include parameters into the SPFILE!

Installing Oracle 19c SE2

- Do not create database!
- Create response file
 - Edit \$ORACLE_HOME/assistants/dbca/templates/New_Database.dbt and uncheck (set to false) unnecessary components!

```
<DatabaseTemplate name="New Database" description="" version="19.0.0.0.0">
  <CommonAttributes>
    <option name="OMS" value="false" includeInPDBs="false"/>
    <option name="JSERVER" value="false" includeInPDBs="true"/>
    <option name="SPATIAL" value="false" includeInPDBs="true"/>
    <option name="IMEDIA" value="false" includeInPDBs="true"/>
    <option name="ORACLE_TEXT" value="false" includeInPDBs="true">
      <tablespace id="SYSAUX"/>
    </option>
    <option name="CWMLITE" value="true" includeInPDBs="true">
      <tablespace id="SYSAUX"/>
    </option>
```

Installing Oracle 19c SE2

- Create the database:

```
./dbca -silent -createDatabase -responseFile \  
/home/oracle/dbca.rsp
```

Installing Oracle 19c SE2

- After database is start, disable some internal jobs
- SQL> exec
dbms_auto_task_admin.disable(
client_name => 'SQL TUNING ADVISOR',
operation => NULL,
window_name => NULL);
- Set job_queue_processes parameter.
- See:
<https://www.pythian.com/blog/technical-track/how-to-create-an-oracle-se2-database-and-avoid-licensing-problems>

Why not Oracle SE2?

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- Same as EE at the core
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ORA-03113: end-of-file on communication channel



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