Oracle Services on RAC

*How They Work and What
You Should Use Them For*

Five Things You Might Not Know

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Chicago
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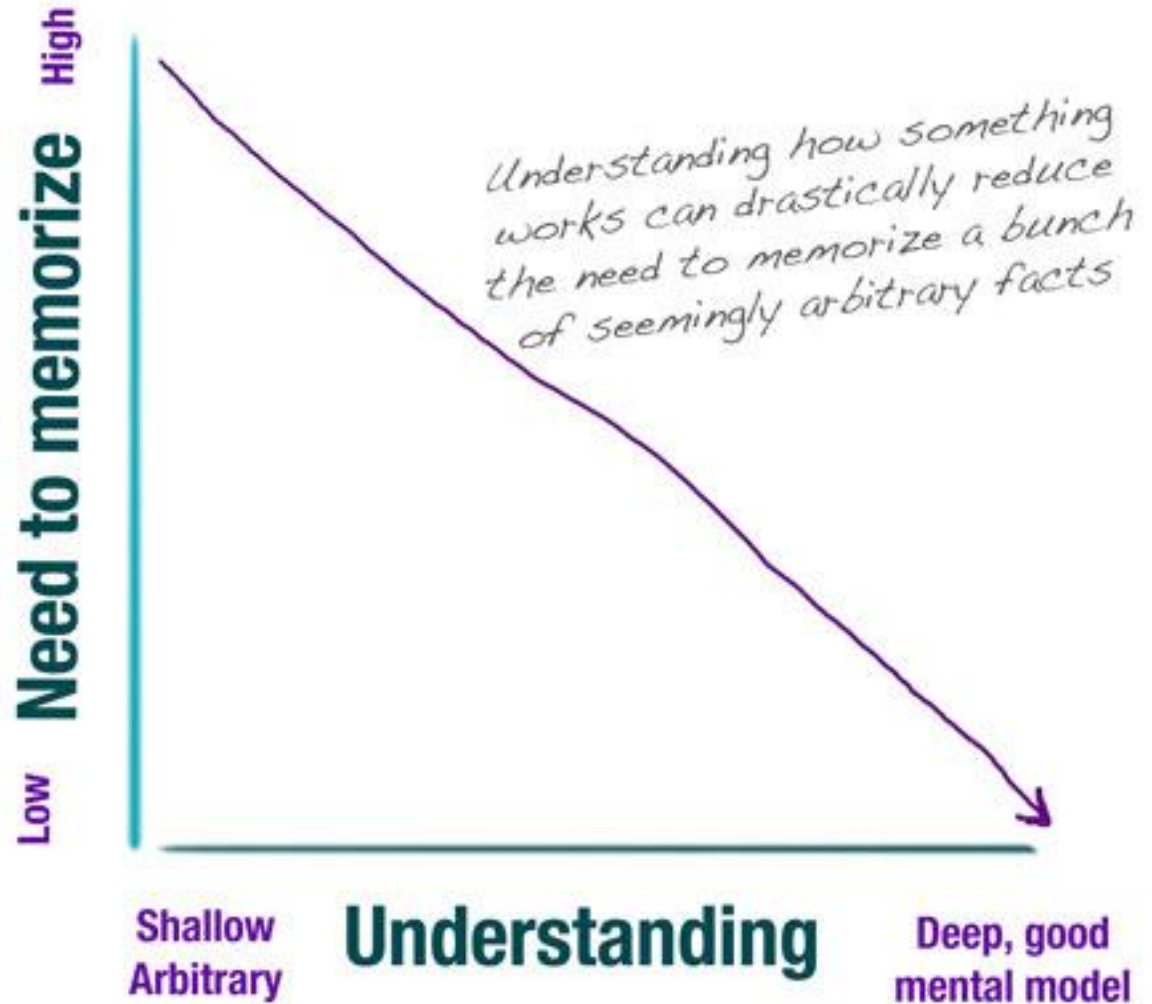Music
Theology
Swing Dancing
Motorcycles
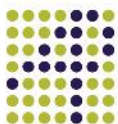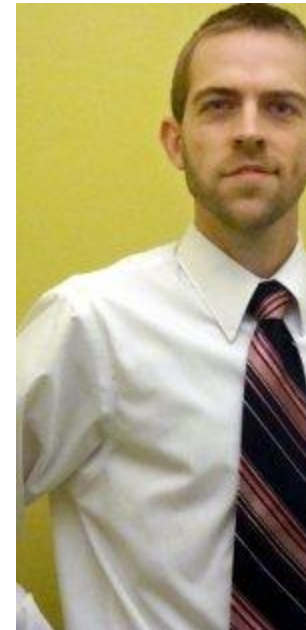
Services

- What are services?
- Do you use RAC?
- Do you use services? (With or without RAC?)
- What do you hope to learn? What questions do you hope to have answered?

Memorize or Understand?

The more they understand, the less they need to memorize

Need to memorize (High / Low)

Understanding how something works can drastically reduce the need to memorize a bunch of seemingly arbitrary facts

Understanding — Shallow Arbitrary → Deep, good mental model

*Thanks to Jared Still and Alex Gorbachev. Originally from:

http://headrush.typepad.com/
creating_passionate_users/2006/
09/how_to_get_user.html

Memorize or Understand?
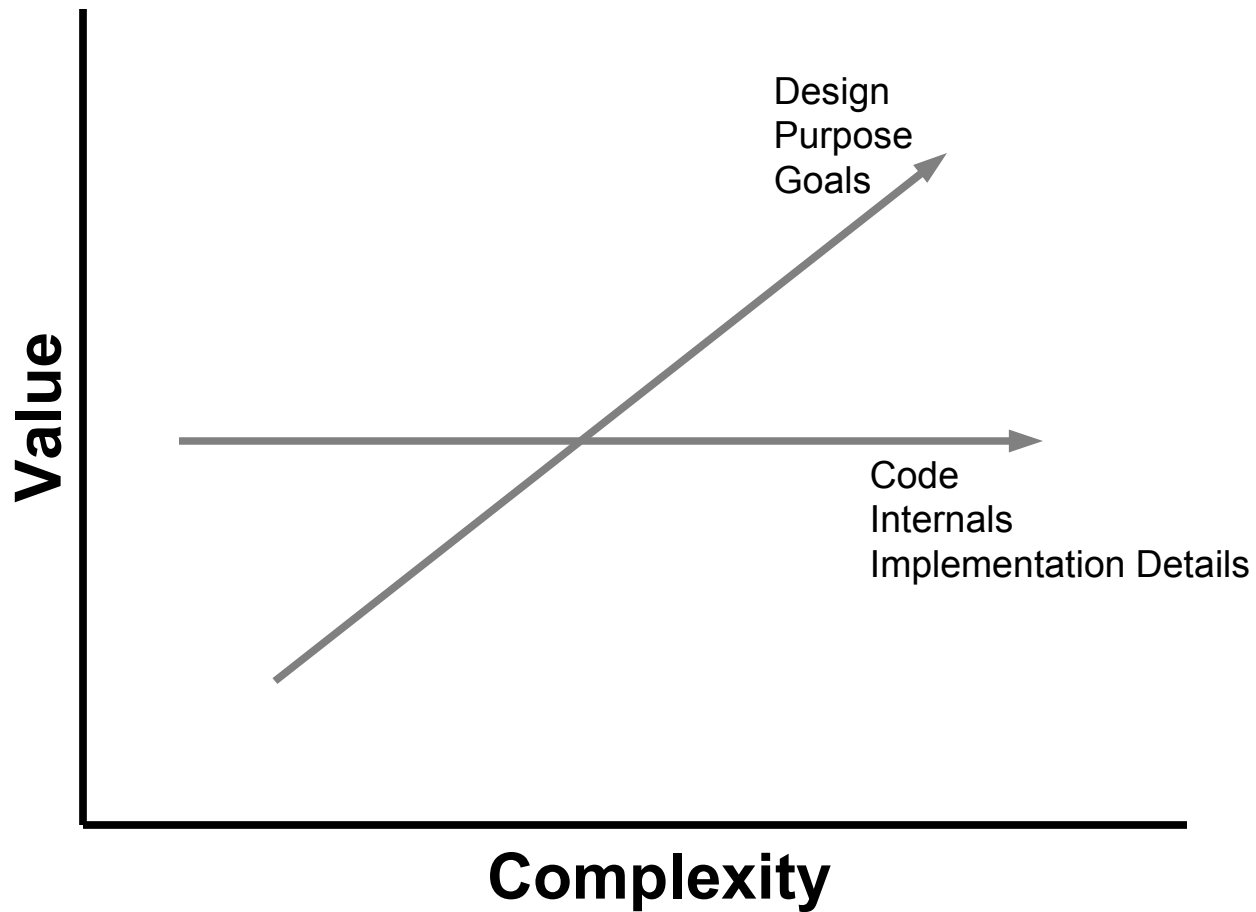
Five things you might not know

- **Services are a lot more than just a connect method**
- There are three different ways to setup services
- Service configuration is stored in four different places
- There are multiple layers of load balancing and connection failover
- Services don't always do what you would expect

What is a SERVICE?

```
ARDENT-SALES.LAB.ARDENTPERF.COM =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = rh4lab10)(PORT = 1521))
    (CONNECT_DATA = (SID = ORCL))
  )


ARDENT-ACCT.LAB.ARDENTPERF.COM =
  (DESCRIPTION =
    (ADDRESS_LIST=
      (FAILOVER = on)
      (LOAD_BALANCE = on)
      (ADDRESS= (PROTOCOL = TCP)(HOST = rh4lab12)(PORT = 1521))
      (ADDRESS= (PROTOCOL = TCP)(HOST = rh4lab13)(PORT = 1521))
      (ADDRESS= (PROTOCOL = TCP)(HOST = rh4lab14)(PORT = 1521))
    )
    (CONNECT_DATA= (SERVICE_NAME = orcl.lab.ardentperf.com))
  )
```
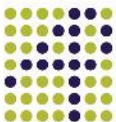
What is a SERVICE?

```
rh4lab12:/home/oracle[orcl]$ lsnrctl stat

[...]

Services Summary...
Service "PLSExtProc" has 1 instance(s).
  Instance "PLSExtProc", status UNKNOWN, has 1 handler(s) for this service...
Service "orcl.lab.ardentperf.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "orclXDB.lab.ardentperf.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "orcl_XPT.lab.ardentperf.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "test1.lab.ardentperf.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "test2.lab.ardentperf.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "test3.lab.ardentperf.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
The command completed successfully
```
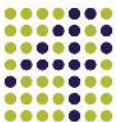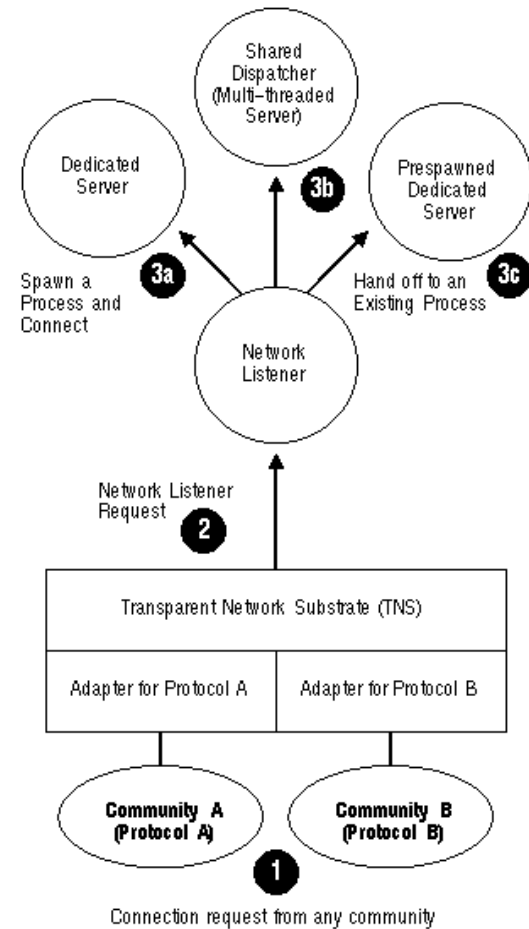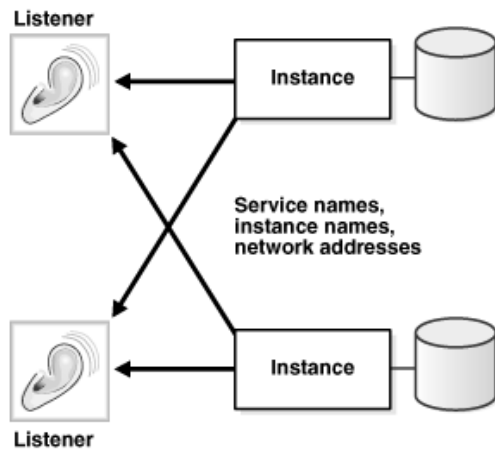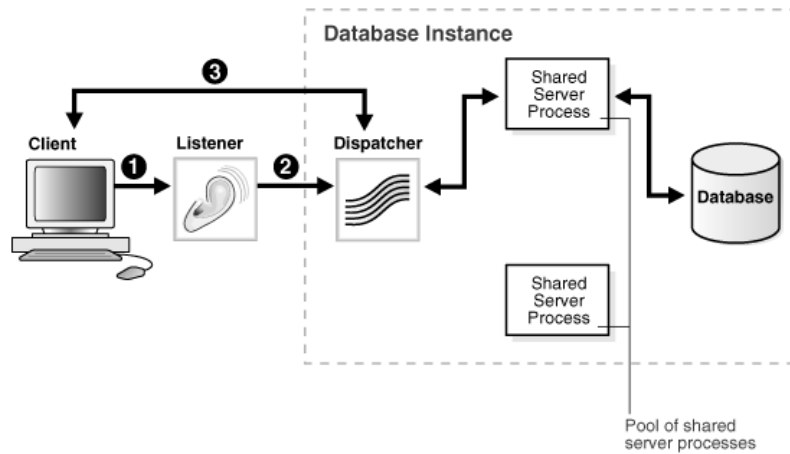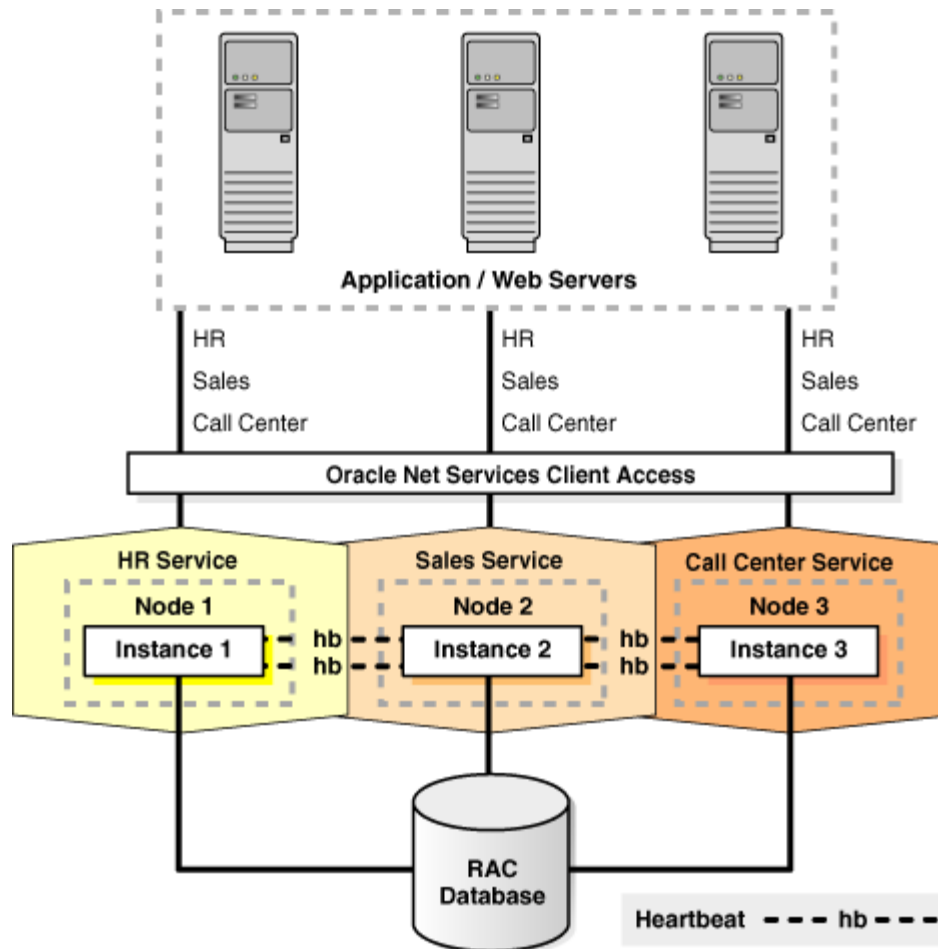
What is a SERVICE?

What is a SERVICE?

More than just a connect method
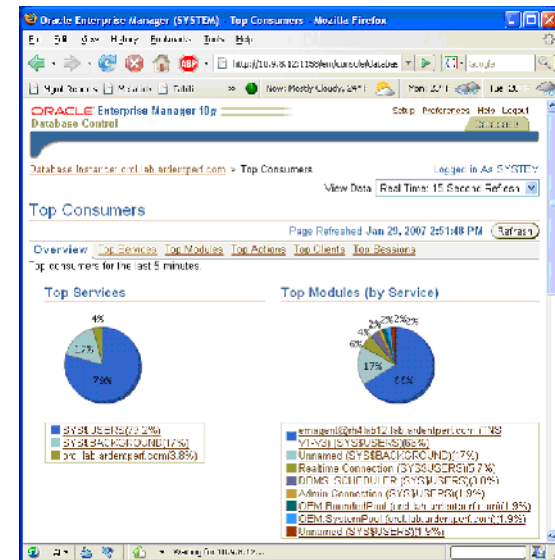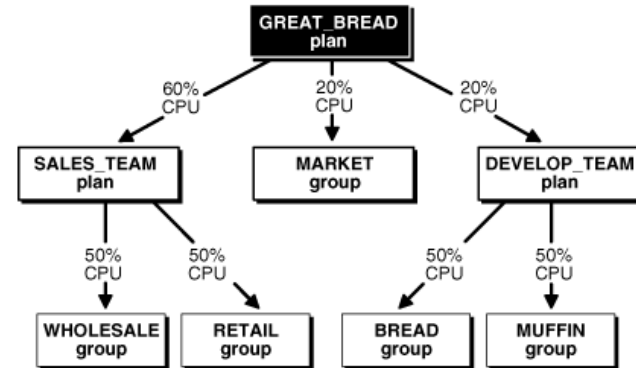
Tuning and Monitoring Aid

- Integration with dynamic views
- All stats automatically collected and aggregated by service
- AWR integration
- Alerts for response time thresholds

Resource Management Aid

- Consumer groups can be mapped to services, modules and actions

Job Control Aid

- Tuning, resource management
- Enable/disable jobs

Single System Image (SSI)

> **A single system image is the illusion, created by software or hardware, that a collection of computing elements is a single computing resource.**
>
> **-- Gregory Pfister, <u>In Search of Clusters</u>**

- Two key properties of SSI:
  - Every SSI has a <u>boundary</u>.
  - SSI can exist at different <u>levels</u>.

- In cluster discussions SSI usually means OS (perspective of admin).
- Services create SSI for database client.
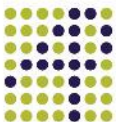
Single System Image (SSI)

Database	**Services**
	(RAC, DG, replication)
Operating System	**Cluster**
	(vcs, hacmp, rhcs, etc)
Hardware	**Hypervisor**
	(esx, lpar, ovm, etc)
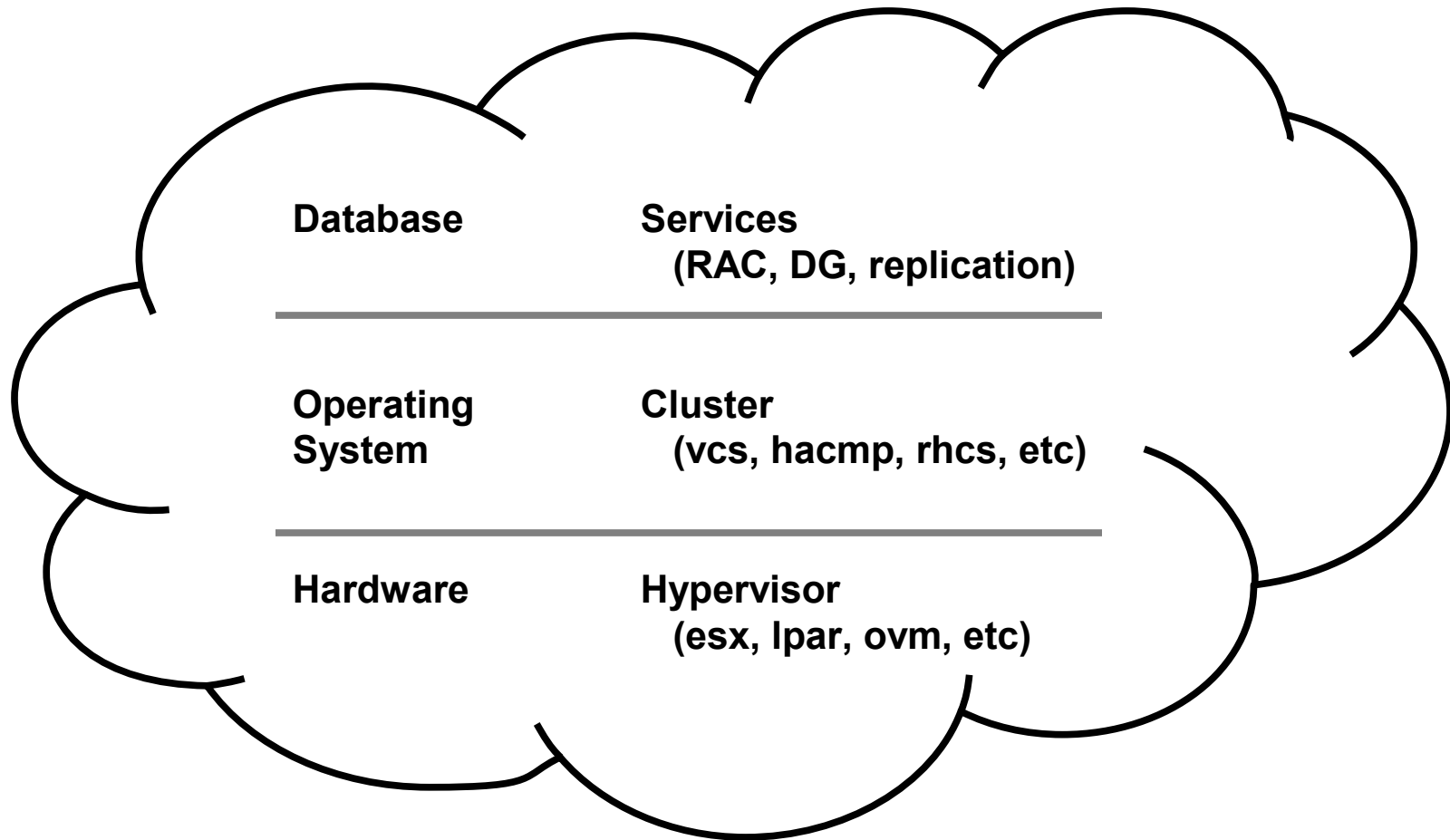
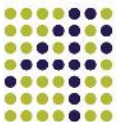# Five things you might not know

- Services are a lot more than just a connect method
- **There are ~~four~~ three different ways to setup services**
- Service configuration is stored in four different places
- There are multiple layers of load balancing and connection failover
- Services don't always do what you would expect

Three ways to setup services

1. Manual for Non-RAC Databases:

- SERVICE_NAMES parameter
  - Text editor (init file)
  - SQLPlus (spfile)
- DBMS_SERVICES

2. Manual for RAC Databases:

- srvctl ~~and DBMS_SERVICES~~
  - Best practice to always perform both steps in 11.1 and older.
 - Never set SERVICE_NAMES!

```
[oracle@rh4lab15 ~]$ srvctl add service -d db2rac1 \
> -s reports -r db2rac11,db2rac12 -P basic

SQL> begin
  2    dbms_service.create_service(
  3      service_name=>'reports',
  4      network_name=>'reports',
  5      goal=>dbms_service.goal_none,
  6      dtp=>FALSE,
  7      aq_ha_notifications=>FALSE,
  8      clb_goal=>dbms_service.clb_goal_long
  9    );
 10  end;
 11  /

PL/SQL procedure successfully completed.

[oracle@rh4lab15 ~]$ srvctl start service -d db2rac1 \
> -s reports

[oracle@rh4lab15 ~]$ lsnrctl services
Service "reports.lab.ardentperf.com" has 2 instance(s)
  Instance "db2rac11", status READY, has 2 handler(s)
  Instance "db2rac12", status READY, has 1 handler(s)
```
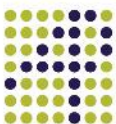
Three ways to setup services

3. Database Console/Grid Control

- Only point/click method in 11g
- Only available for RAC databases
- Many available options
  - Service level thresholds
  - Consumer groups, job classes
  - Notification properties
  - Load balancing goal
  - DTP option

Three ways to setup services

4. DBCA

- Final steps of database creation (number 12 of 15)
- Services management page from DBCA main menu
- Only available in 10g

- Maintains server's TNSNAMES.ORA
- Does not call DBMS_SERVICES
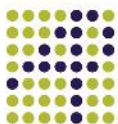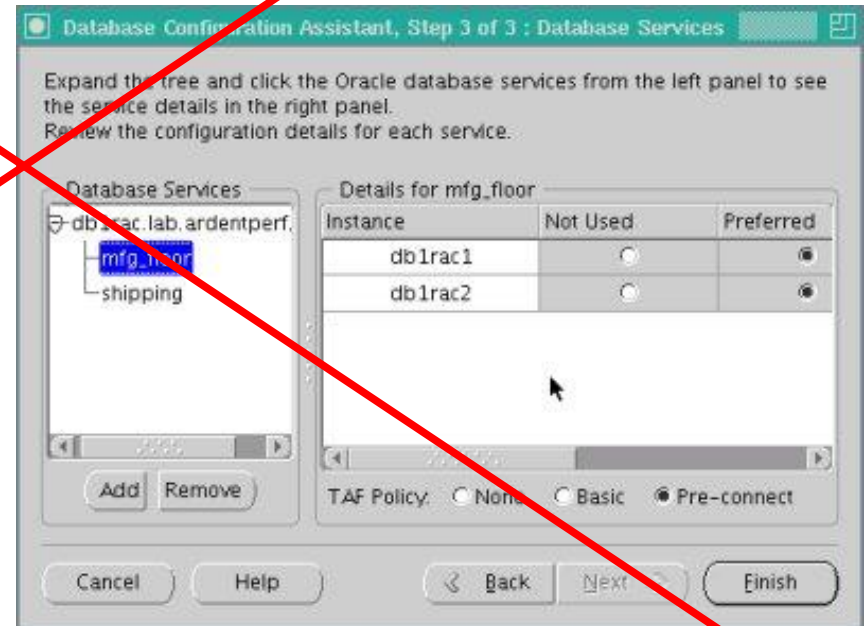
Database Configuration Assistant, Step 3 of 3 : Database Services

Expand the tree and click the Oracle database services from the left panel to see the service details in the right panel.
Review the configuration details for each service.

Database Services
- db1rac.lab.ardentperf.
  - mfg_floor
  - shipping

Details for mfg_floor

Instance	Not Used	Preferred
db1rac1	○	●
db1rac2	○	●

Add   Remove

TAF Policy: ○ None   ○ Basic   ● Pre-connect

Cancel   Help   Back   Next   Finish

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- Services don't always do what you would expect

Where's the configuration stored?

cluster registry (ocr)	voting disk/quorum	ASM disk headers
control file	redo log	temporary tablespace
rollback/undo	datafile headers	data dictionary
workload repository (awr)	OS startup scripts (init.d)	oratab
oraInst.loc	inventory	init.ora or spfile
sqlnet.ora	listener.ora	tnsnames.ora

Where's the configuration stored?

cluster registry (ocr)   ASM disk headers

control file

                              datafile headers   data dictionary

workload repository (awr)   oratab

                                                                init.ora or spfile

sqlnet.ora   listener.ora   tnsnames.ora

Where's the configuration stored?

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                              datafile headers   **data dictionary**

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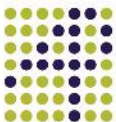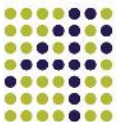
                                                            init.ora or spfile

sqlnet.ora   listener.ora   **tnsnames.ora**

Where's the configuration stored?

- **Data Dictionary**
    (Bulk of service configuration)
    - DBA_SERVICES
    - DBA_RSRC_GROUP_MAPPINGS
    - DBA_THRESHOLDS
    - DBA_SCHEDULER_JOB_CLASSES

- **TNSNAMES.ORA**
    - Server-side
        - Entries for LOCAL_LISTENER and REMOTE_LISTENER
    - Client-side
        - CONNECT_DATA
        - Special entries for PRECONNECT services

- **Cluster Registry**
    - Resource
        - Start/stop script
        - Dependencies
        - Restart policy
    - Stringpairs
        - Instance list
        - Preferred/available
        - Enabled/disabled
        - TAF polocy

- **Initialization Parameters**
    - LOCAL_LISTENER
    - REMOTE_LISTENERS
    - DB_DOMAIN
   - DISPATCHERS
    - STATISTICS_LEVEL

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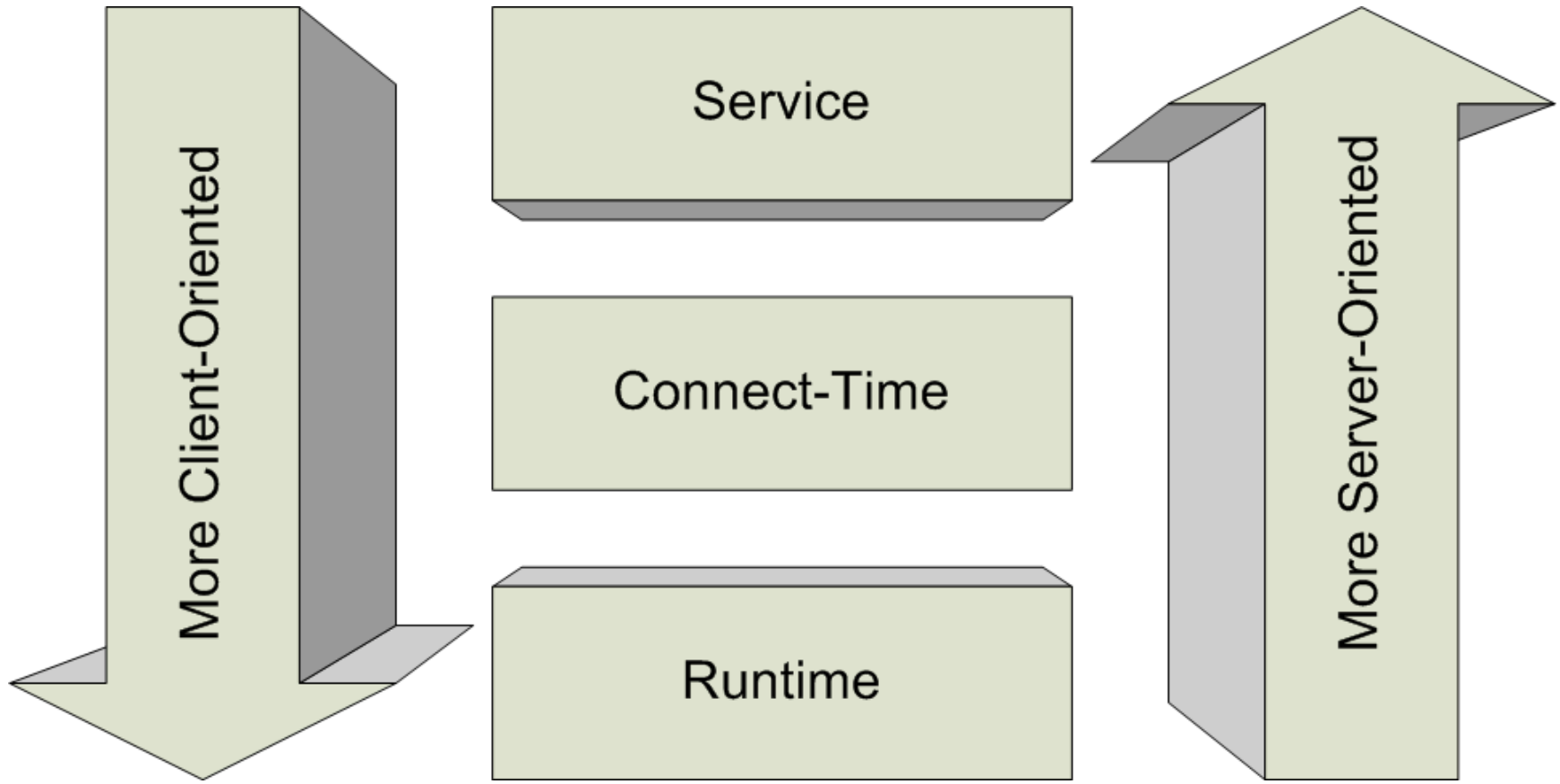- Services don't always do what you would expect

Three layers of load balancing

Better Load Balancing

Client TNSNAMES

Listener

Connection Pool

Less Complicated
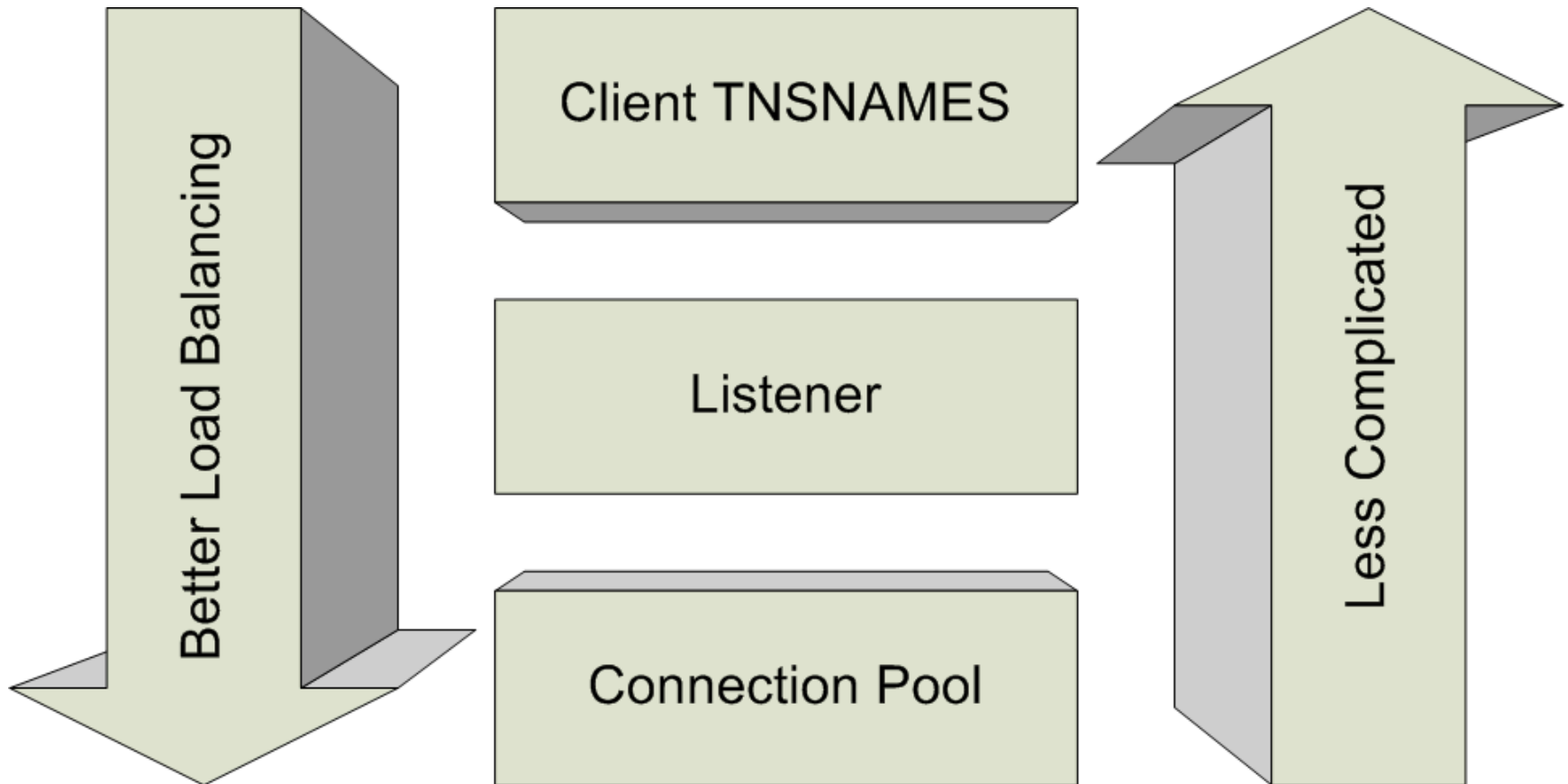
Three layers of connection failover

More Client-Oriented

Service

Connect-Time

Runtime

More Server-Oriented

Three layers of TNSNAMES

```
ARDENTACCT.LAB.ARDENTPERF.COM =
  (DESCRIPTION_LIST =
    (LOAD_BALANCE = ON)
    (FAILOVER = ON)
    (DESCRIPTION = ... )
    (DESCRIPTION =
      (LOAD_BALANCE = ON)
      (FAILOVER = ON)
      (ADDRESS_LIST = ... )
      (ADDRESS_LIST =
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        (ADDRESS= (PROTOCOL = TCP)(HOST = rh4lab12)(PORT   = 1521))
        (ADDRESS= (PROTOCOL = TCP)(HOST = rh4lab13)(PORT   = 1521))
      )
      (CONNECT_DATA= (SERVICE_NAME = orcl.lab.ardentperf.com))
    )
  )
```

"Client TNSNAMES" load balancing and "Connect-Time" failover.
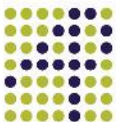
Three layers of runtime failover

1. Client-Side TAF
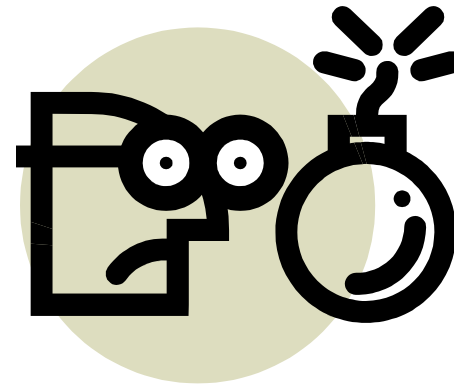
- The original runtime failover – existed since Oracle8
- Use FAILOVER_MODE block in TNSNAMES file

3. Fast Connection Failover

- New in 10g
- JDBC Connection Pools
- Utilizes FAN events

2. Server-Side TAF

- New in 10g
- Attribute of service
- Overrides TNSNAMES
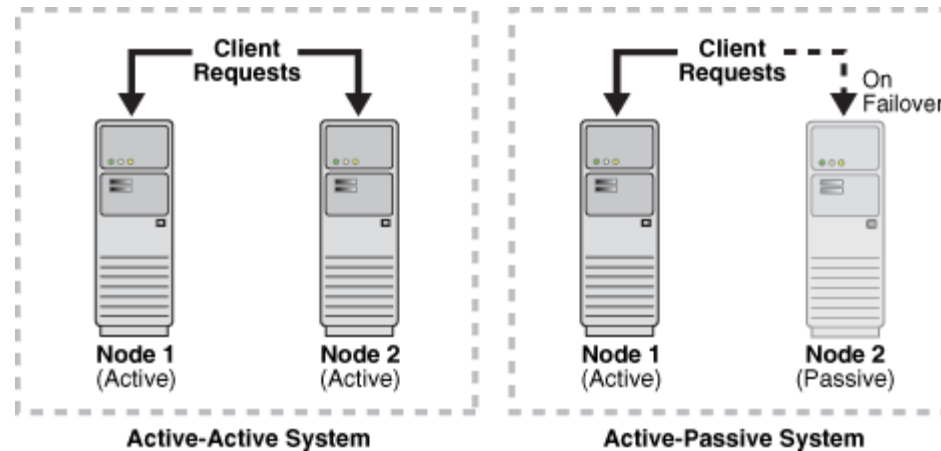
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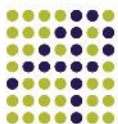
Unexpected behavior
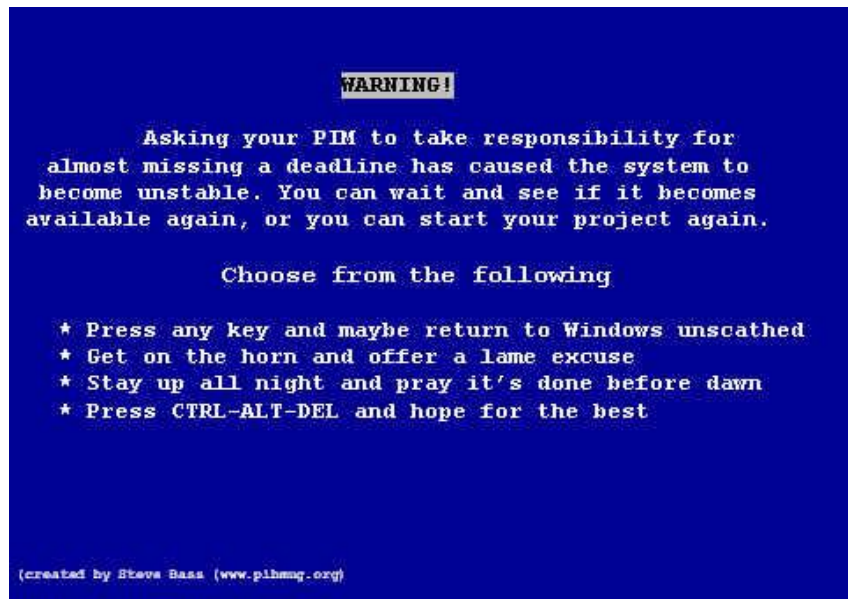
Unexpected behavior

Preferred-Available ≠ Single Node Performance

- What is an active-passive cluster?
  - Note: services obsolete active_instance_count for all practical purposes
- Cluster overhead impacts performance
- Caution: Partitioning different kinds of work on the same objects?
- If clustering <u>only</u> for HA, avoiding RAC is often better

Unexpected behavior

WARNING!

Asking your PIM to take responsibility for almost missing a deadline has caused the system to become unstable. You can wait and see if it becomes available again, or you can start your project again.

Choose from the following

* Press any key and maybe return to Windows unscathed
* Get on the horn and offer a lame excuse
* Stay up all night and pray it's done before dawn
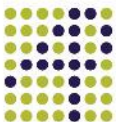* Press CTRL-ALT-DEL and hope for the best

(created by Steve Bass (www.pibmug.org)

No Failback

- After <u>preferred</u> node comes back online, service will NOT automatically move back from <u>available</u> node.

No Auto-Start

- 10g clusterware will attempt to return services to their last-known state. If you shutdown with <u>srvctl</u> then the service will not start after reboot.

Unexpected behavior

Parallel Execution

- 10g and older versions
  - PQ slaves inherit service name
  - Slaves run on all nodes by default, ignoring PREFERRED and AVAILABLE nodes for service
  - Execution controlled through INSTANCE_GROUPS and PARALLEL_INSTANCE_GROUPS

- 11g
  - Slaves run only on nodes where service is active
  - PARALLEL_INSTANCE_GROUPS overrides default behavior
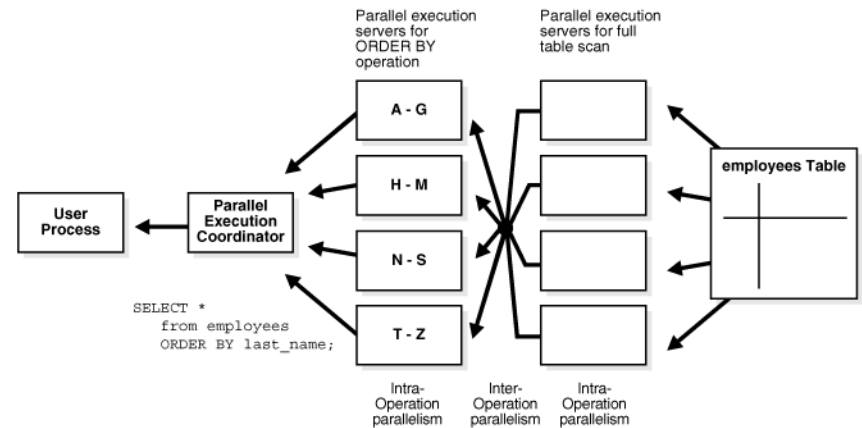
Unexpected behavior

<u>SCAN and DB Clients</u>

- 11gR1 and older versions
  - Cannot handle multiple IP addresses returned by DNS or GNS
  - No connect-time failover
  - Include all three SCAN VIP addresses into TNSNAMES

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2. There are four different ways to setup services
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5. Services don't always do what you would expect

How do I get started?
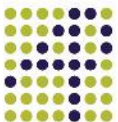
What is a SERVICE?

> **A service is a logical abstraction of a single group of database clients or a single application.**

Each service represents a workload with common:
- attributes
- service-level thresholds
- priorities

The grouping is based on attributes of work that might include:
- the application function to be used
- the priority of execution for the application function
- the job class to be managed
- the data range used in the application function or job class
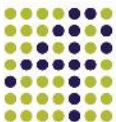
Example Service Names
cust-portal-prod
cust-portal-bulk-load
crm-prod
development-wiki
rman-repository

Q&A

Questions, comments, suggestions?