Web Scale PHP Connection Broker

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Server Technologies - Database Access and Programming Interfaces

Agenda

✓ Motivations
- Traditional Oracle/PHP Connection
- Web Scale Connection Broker
- High Availability for PHP with RAC

Motivations

Web Scale Deployment Requirements

- Scaling from Zero to Hero
  - Optimize memory and CPU on low end commodity hardware
  - Sustain very high number of connection requests
  - Sustain unpredictable workload
  - Optimize database server resources
- High Availability
  - 24 x 7
  - Resilience to database instance failure

Agenda

- Motivation

✓Traditional Oracle/PHP Connection

  - Non Persistent Connections
  - Persistent Connections

- Web Scale Connection Broker
- High Availability for PHP with RAC

Traditional Oracle/PHP

Connection Management

Non Persistent Connections

Standard Connection

```
$c = oci_connect($username, $password, $dbname);
```

- Connection exists through the life of the script
- Second oci_connect() in script returns same DB connection

Multiple Unique Connections

```
$c = oci_new_connect($username, $password, $dbname);
```

- Connection exists through the life of the script
- Each oci_new_connect() returns a new DB connection
- Use for independent operations

What is Wrong with Non-Persistent Connections

- High CPU Overhead
  - Connection Establishment Time
  - Frequent and Excessive Connect/Disconnect
- Cannot Scale in Web Environments
  - Max Out Database Server CPU
    - 1 database server process per PHP user
  - Cannot handle the *Digg effect*

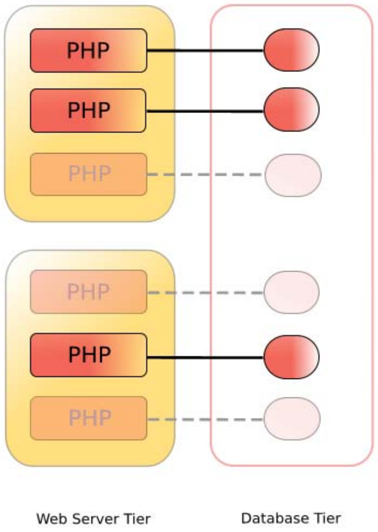
Persistent Connections

```
$c = oci_pconnect($username, $password, $dbname);
```

- Connection not automatically closed at script completion
- Fast for subsequent connections
  - But holds resources

- Configurable in *php.ini*

```
oci8.max_persistent
oci8.persistent_timeout
oci8.ping_interval
```



What is Wrong with Persistent Connections

- High Memory Overhead
  - Many Idle Cached Connections
- Limited Scalability in Web Environment
  - Max Out Database Server Memory
    - Idle Apache processes retain connections that are not pooled
  - Cannot handle the “*Digg effect*”

Agenda

- Requirement - Motivations
- Traditional Oracle/PHP Connection

✓Web Scale Connection Broker

  - Database Resident Connection Pool (DRCP)
  - DRCP: How It Works
  - DRCP: Applications Usage
  - Configuration and Sizing
  - Scalability Benchmark

- High Availability for PHP with RAC

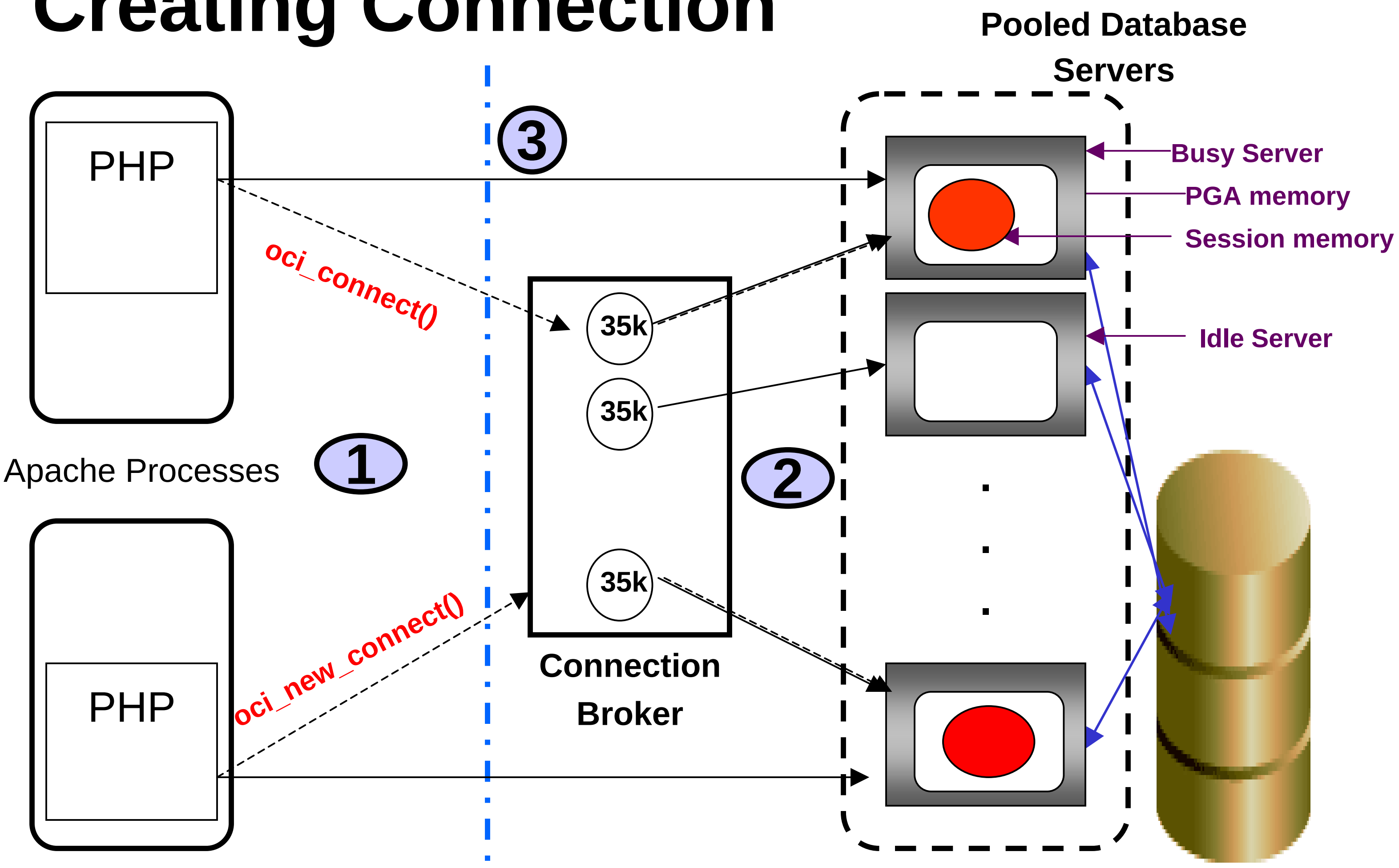
Database Resident Connection Pool

- Pools dedicated servers on database side
- Shares connections across apache processes
- Shares connections across middle tier nodes
- Co-exists in all database server configurations
  - Dedicated Servers, Shared Servers, RAC
- Exposed to PHP

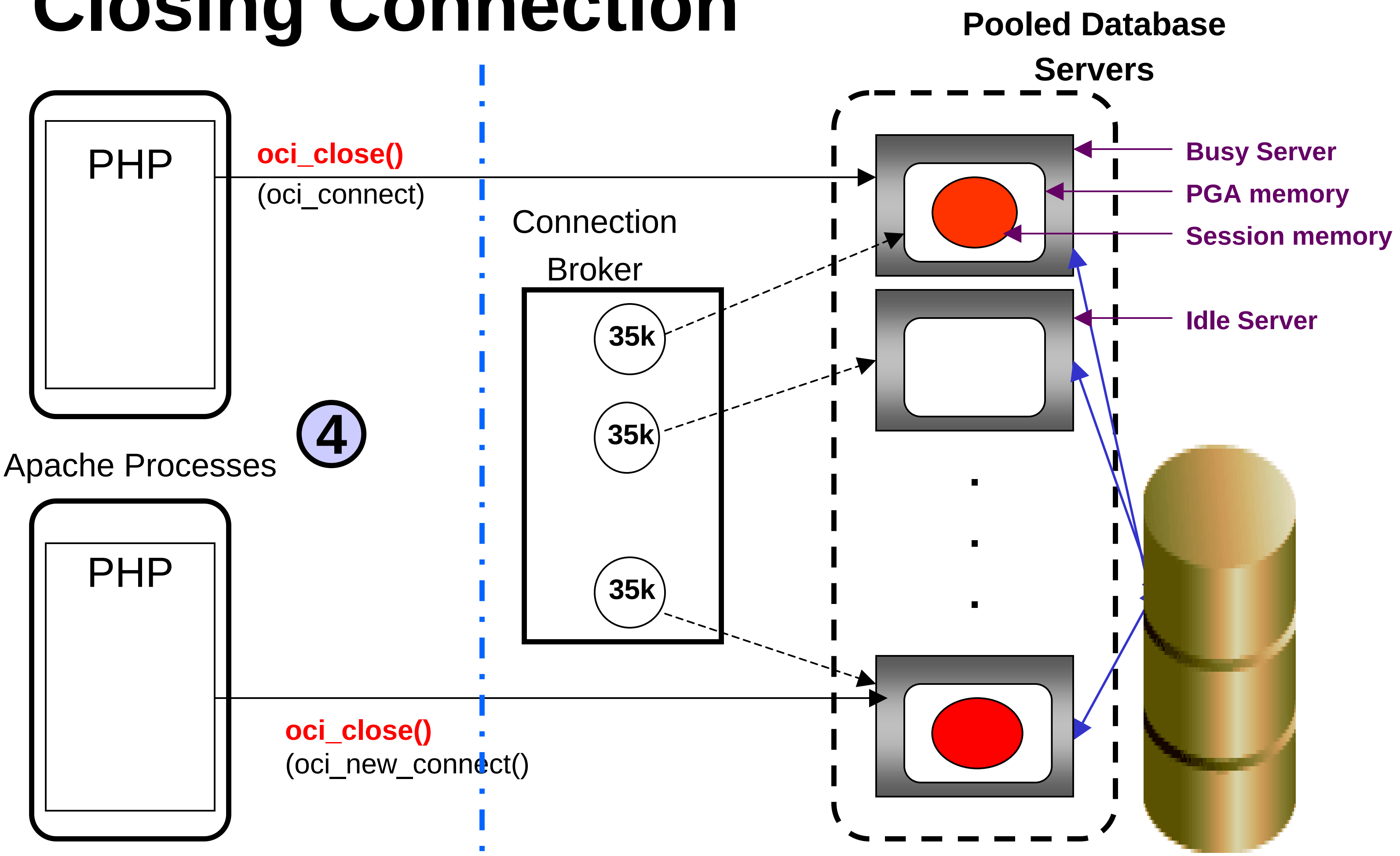
DRCP with Non-Persistent

Connections

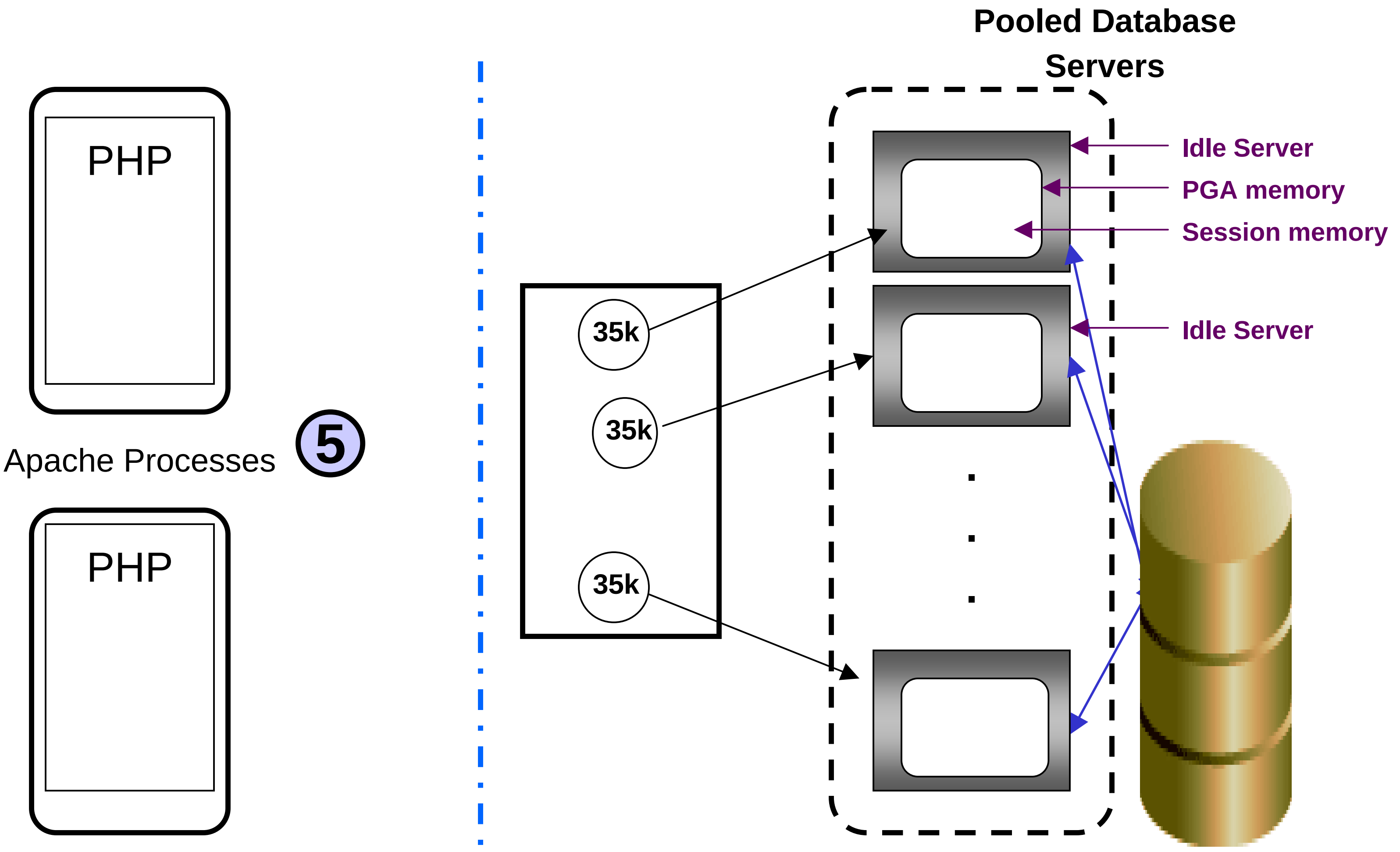
DRCP with Non-Persistent Connection Creating Connection



DRCP with Non-Persistent Connection Closing Connection

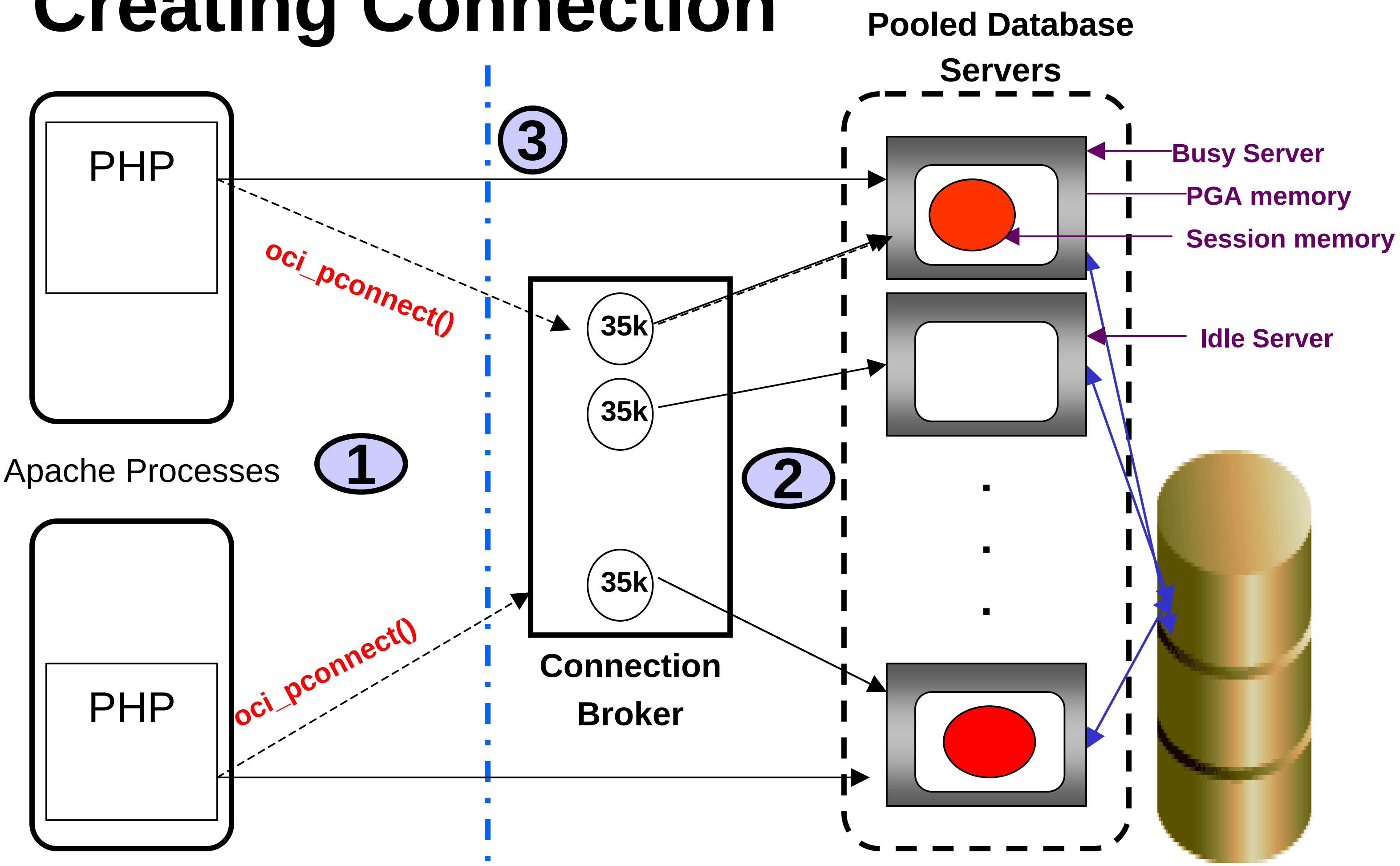


DRCP with Non-Persistent Connection

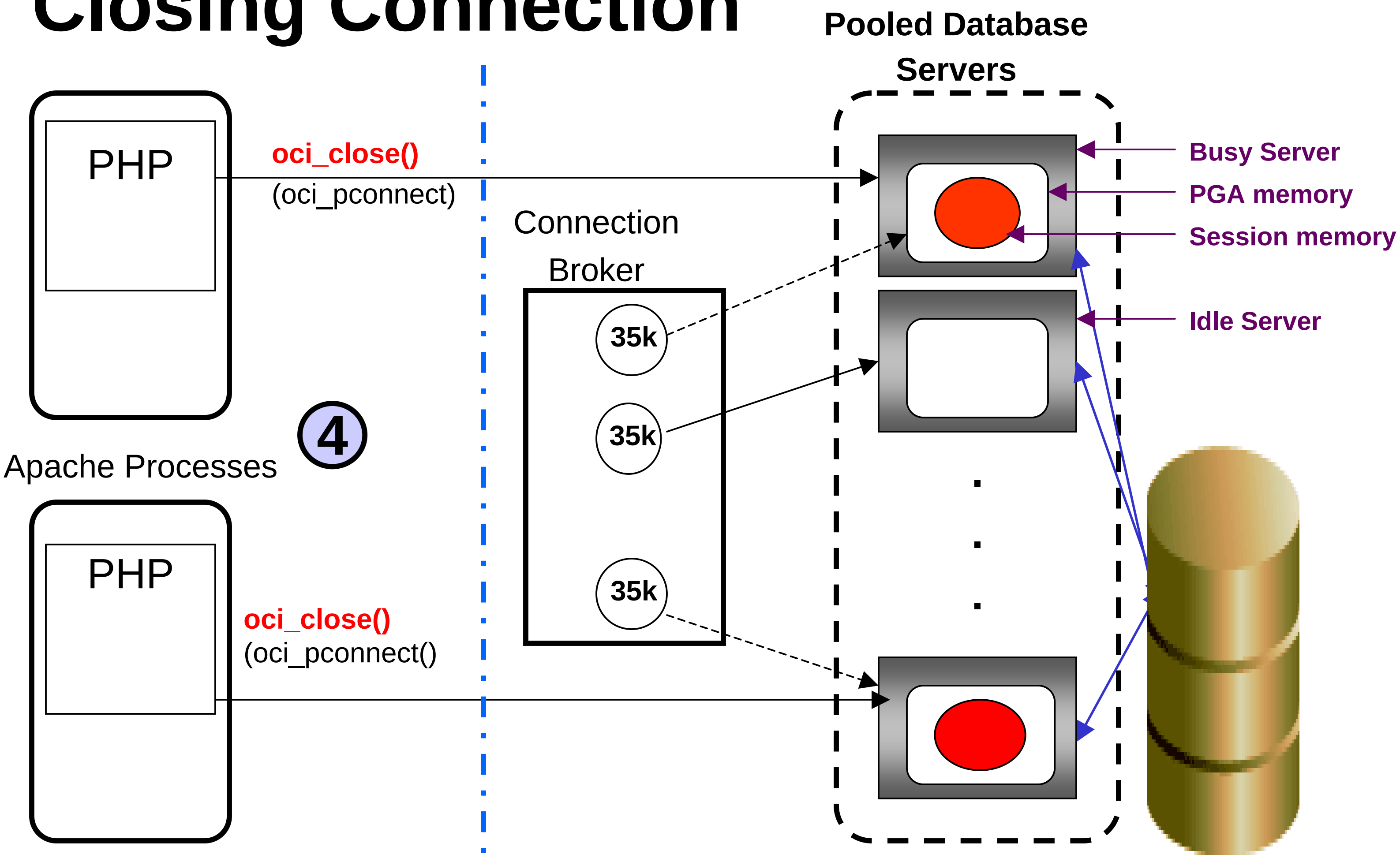


DRCP with Persistent Connections

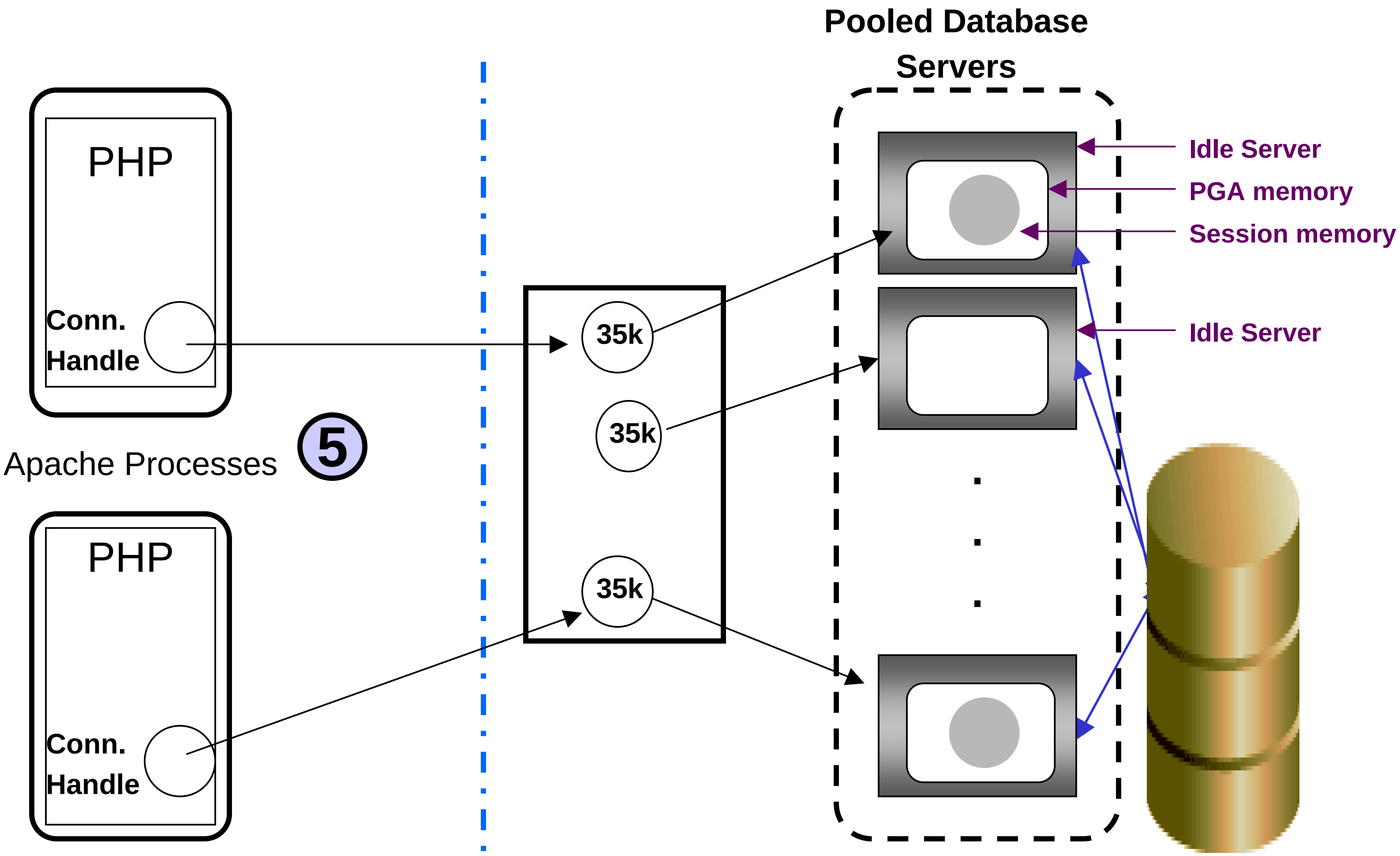
DRCP with Persistent Connections
Creating Connection



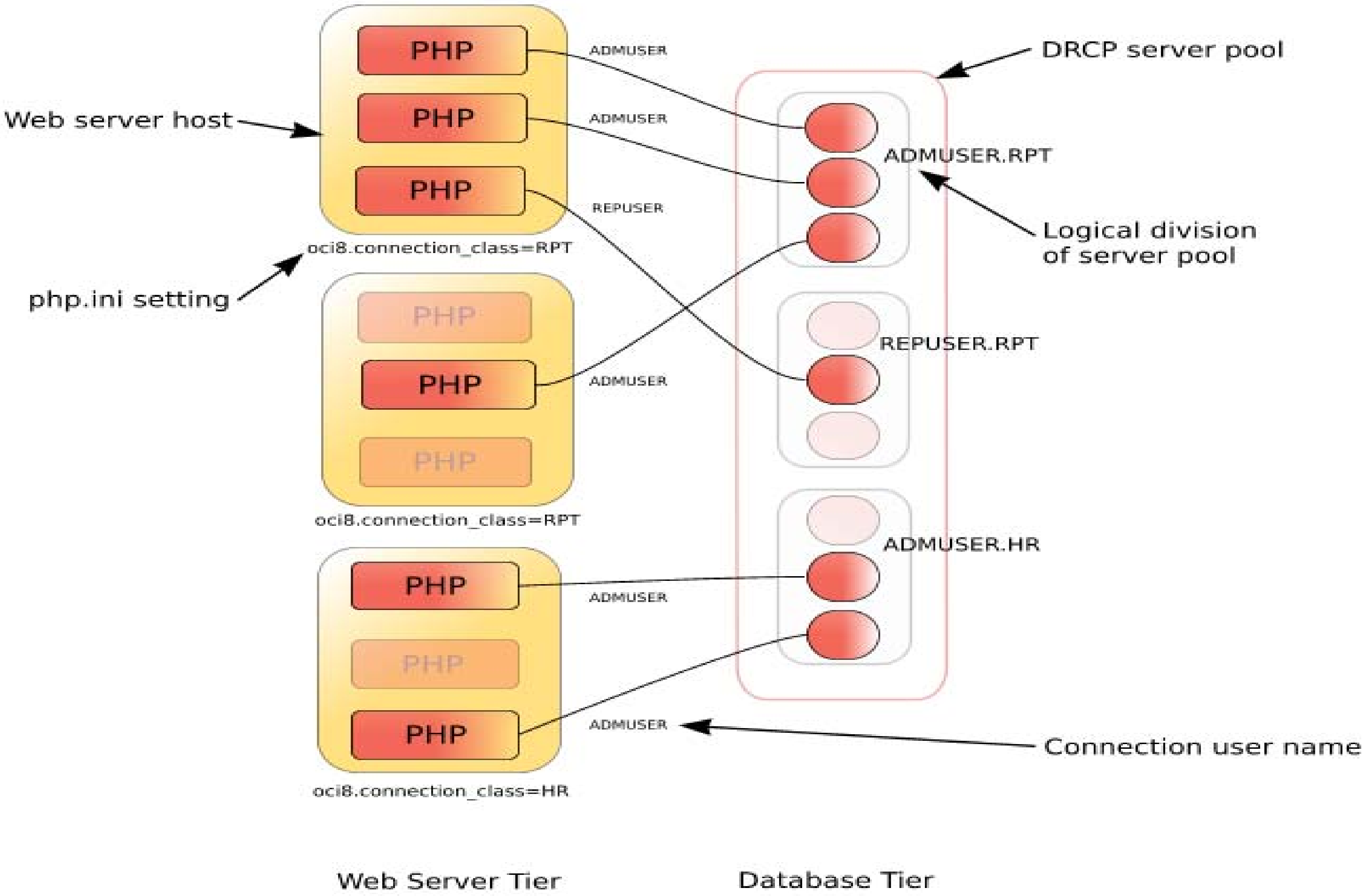
DRCP with Persistent Connections
Closing Connection



DRCP with Persistent Connections



Sub-Partitioning the Pool



Configuring and Using DRCP

Download the new PHP OCI8 1.3.1 (currently beta)

1. Configure & Start the Pool

   ```
   SQL> execute dbms_connection_pool.start_pool();
   ```

2. Set oci8.connection_class = “<*your application*>"

   ```
   oci8.connection_class = MY_APP_CC
   ```

3. Specify “*:POOLED*” in the connect string

   ```
   $c = oci_pconnect('myuser', 'mypassword',
          'myhost/sales:POOLED');
   ```

That’s it!

Configuring the POOL

```
SQL> execute dbms_connection_pool.configure_pool(
  2         pool_name =>
   'SYS_DEFAULT_CONNECTION_POOL',
  3         minsize                => 4,
  4         maxsize                => 40,
  5         incrsize               => 2,
  6         session_cached_cursors => 20,
  7         inactivity_timeout     => 300,
  8         max_think_time         => 600,
  9         max_use_session        => 500000,
 10         max_lifetime_session   => 86400);
```

DRCP Availability in PHP

- DRCP is available in the new OCI8 1.3.1 beta
- Must be linked with Oracle database 11g client libraries against an Oracle database 11g
- Default in PHP 5.3 and PHP 6
- PHP 5.2.4+
  - Build PHP with DRCP-enabled OCI8 1.3.1 Beta from PECL under PHP 5.2.4+ ext/oci8; configure, build, and install PHP as normal
  - Alternatively use *phpize* and build OCI8 as a shared module

- Note: The new OCI8 extension is backward compatible with older Oracle clients libraries

Sample Sizing for 5000 Clients

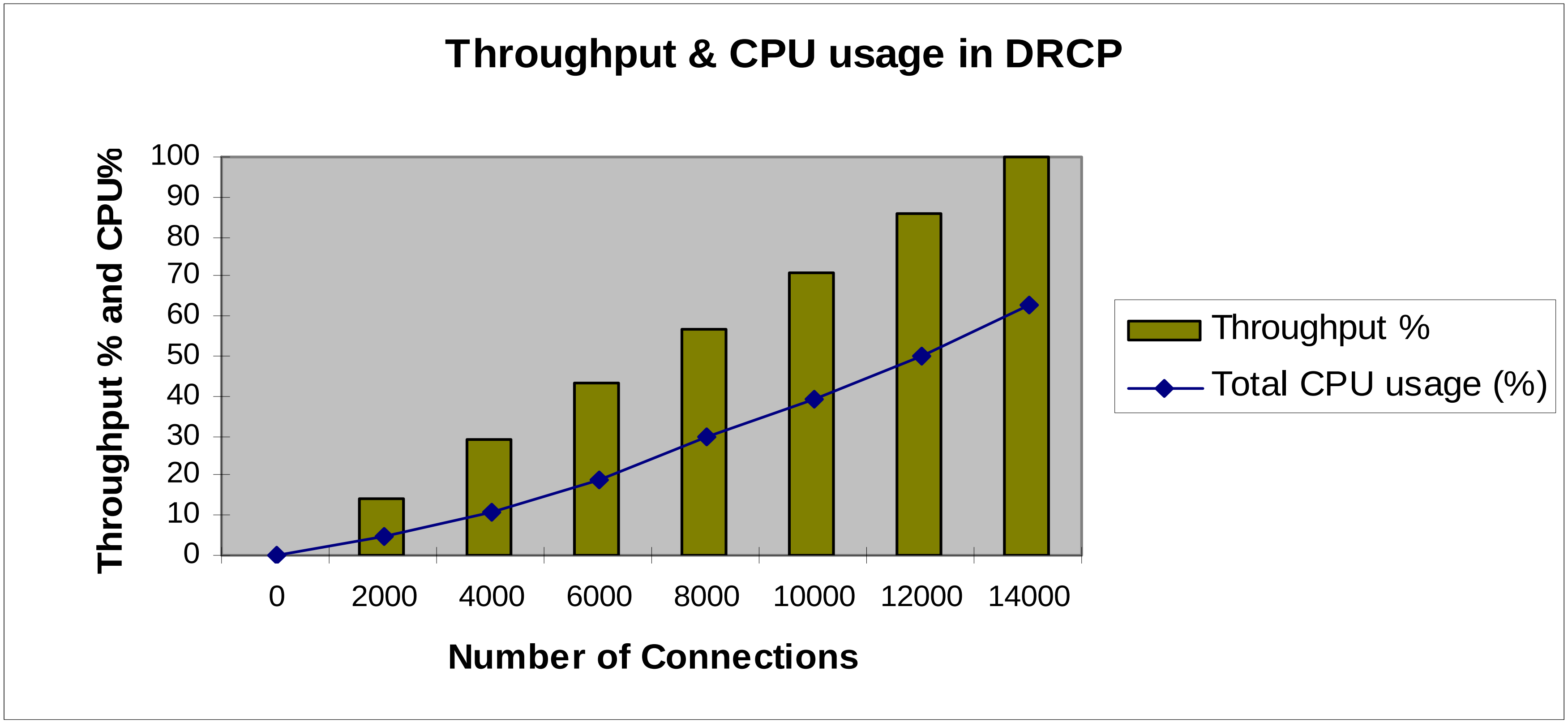
	Dedicated Servers	Shared Servers	_DRCP Servers_
Database Servers	_5000 * 4 MB_	_100 * 4 MB_	_100 * 4 MB_
Session Memory	_5000 * 400 KB_	_5000 * 400 KB_	_100 * 400 KB_
DRCP Memory Overhead			_5000 * 35 KB_
Total Memory	22 GB	2.5 GB	_615 MB_

DRCP Scalability Benchmark

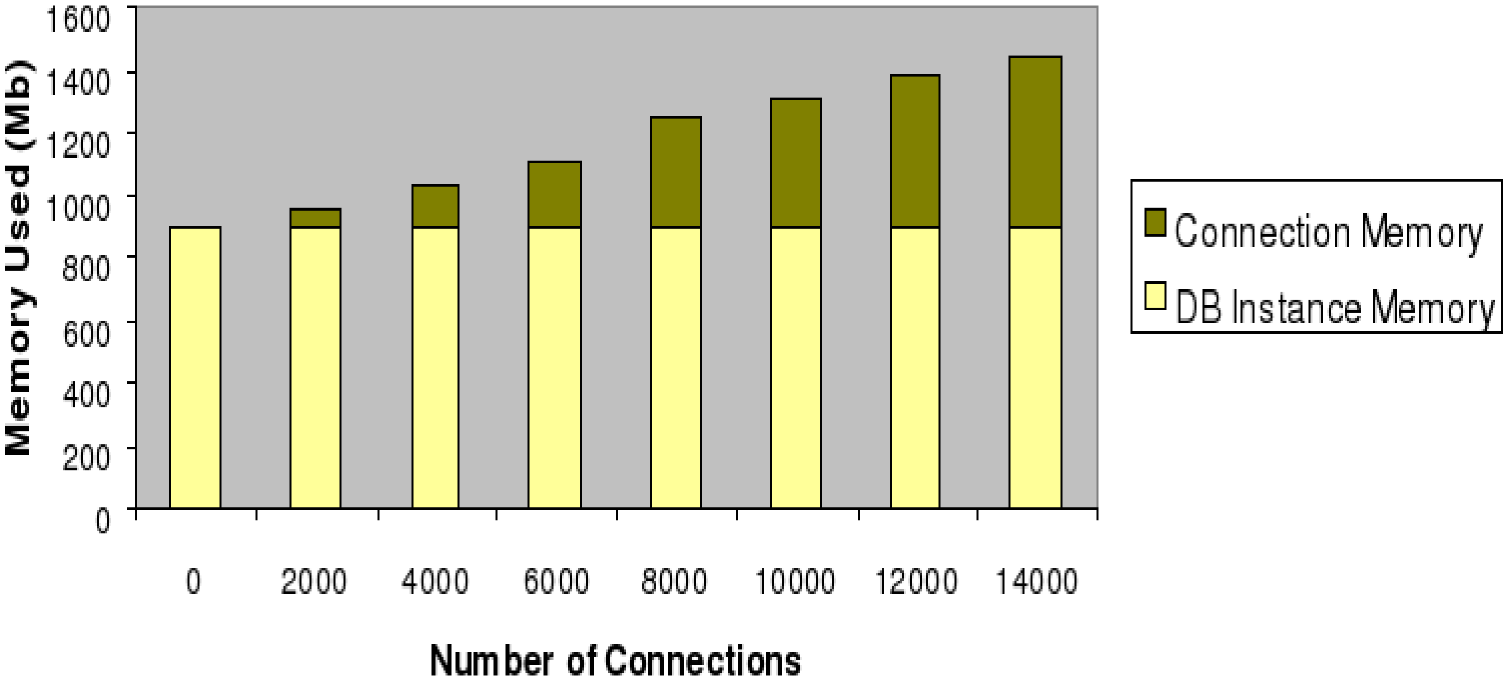
Database Server

- 4 CPU Intel Xeon MP 2.80GHZ
- 2GB RAM
- Red Hat Enterprise Linux 4
- Oracle database 11*g* R1
- DRCP
  - 1 Connection Broker
  - 100 Pooled Servers.

DRCP Scalability Benchmark



DRCP Scalability Benchmark



Agenda

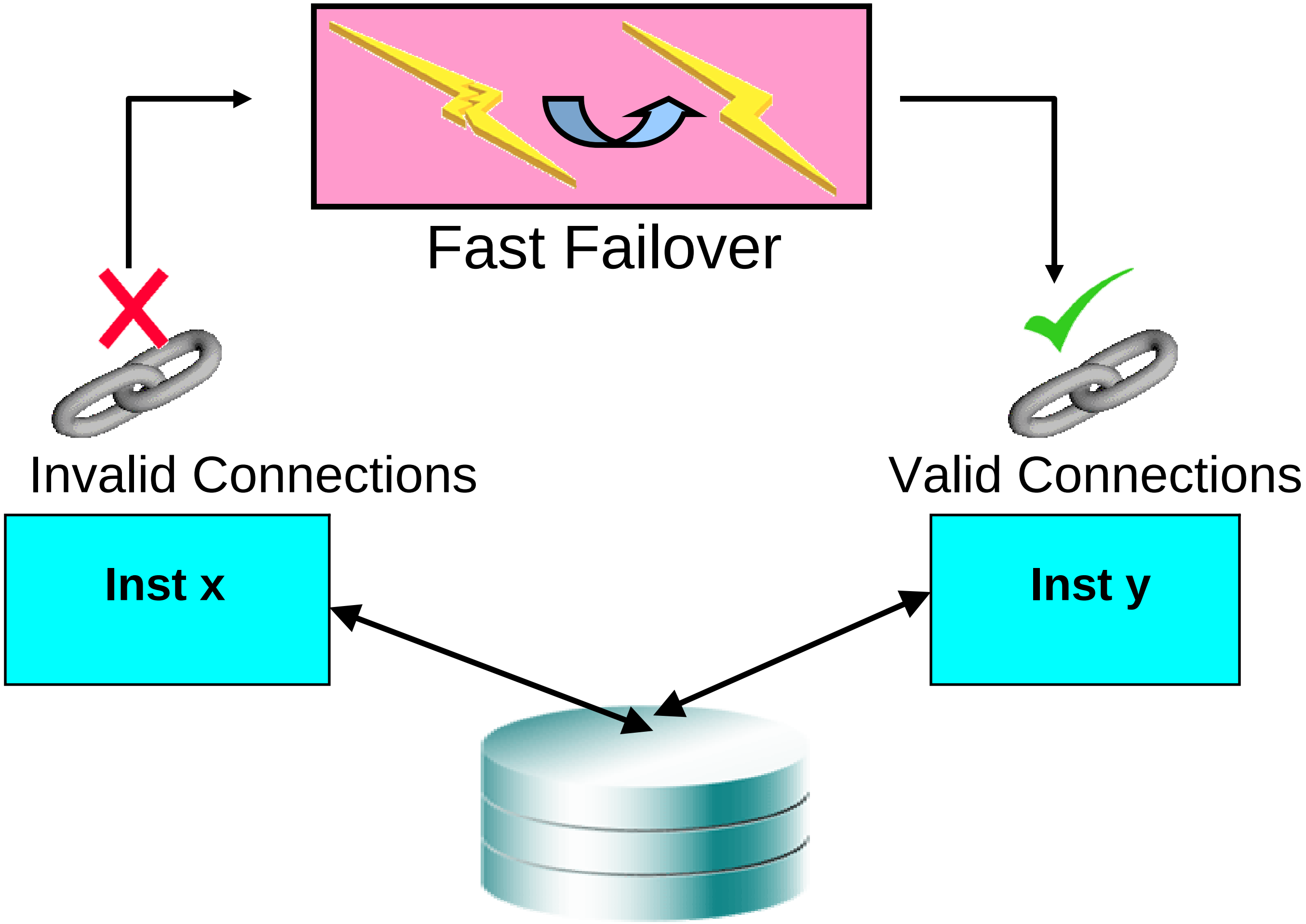
- Requirements - Motivations
- Traditional Oracle/PHP Connection
- Web Scale Connection Broker

✓High Availability for PHP

  - Fast Application Notification of Events (FAN)
  - Fast Failover

High Availability for PHP

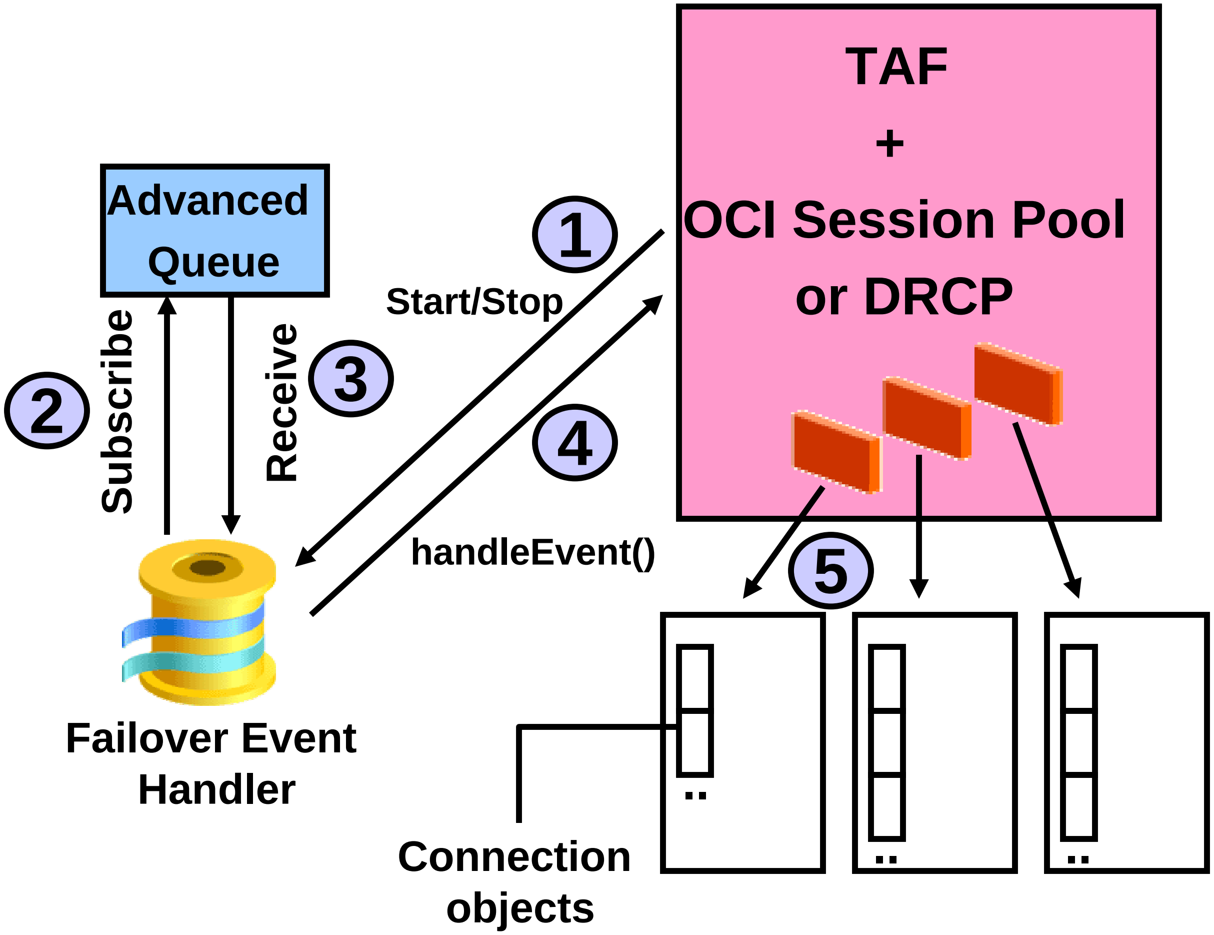
High Availability – Application View



High Availability –
Fast Application Notification of Events

- Pub/Sub event notification
- High Availability feature for PHP with RAC or Data-Guard-with-physical-standby
- When DB node or network fails
  - Database generates FAN events
  - PHP error returned without TCP timeout delay
  - PHP application can reconnect to surviving instance
- OCI8 1.3.1 Beta supports FAN

High Availability – Fast Fail-Over



Fast Failover – Configuration

- Subscription to RAC Events

```
SQL> execute
  dbms_service.modify_service(service_name
  =>'SALES', aq_ha_notifications =>TRUE);
```

- Configure PHP (php.ini)

```
oci8.events = On
```

- OCI Session Pool transparently removes invalid connections from the pool
- Works with and without DRCP

Fast Failover – PHP

The Application

```
. . .
$conn = doConnect();
$err = doSomeWork($conn);
. . .
if (isConnectionError($err)) {
   // reconnect and retry
   $conn = doConnect();
   $err = doMoreWork($conn);
}
if ($err) {
  // probably some other issue
  handleError($err);
}
```

Fast Failover – PHP

```
function isConnectionError($err)
{
  switch($err)
  {
    case 3113: // ORA-3113
    case 3114:
    case 3125:
    case 3122:
    case 1033:
    case 1034:
    ...
    case 12153:
  return true;
   }
  return false;
}
```

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- Install guides
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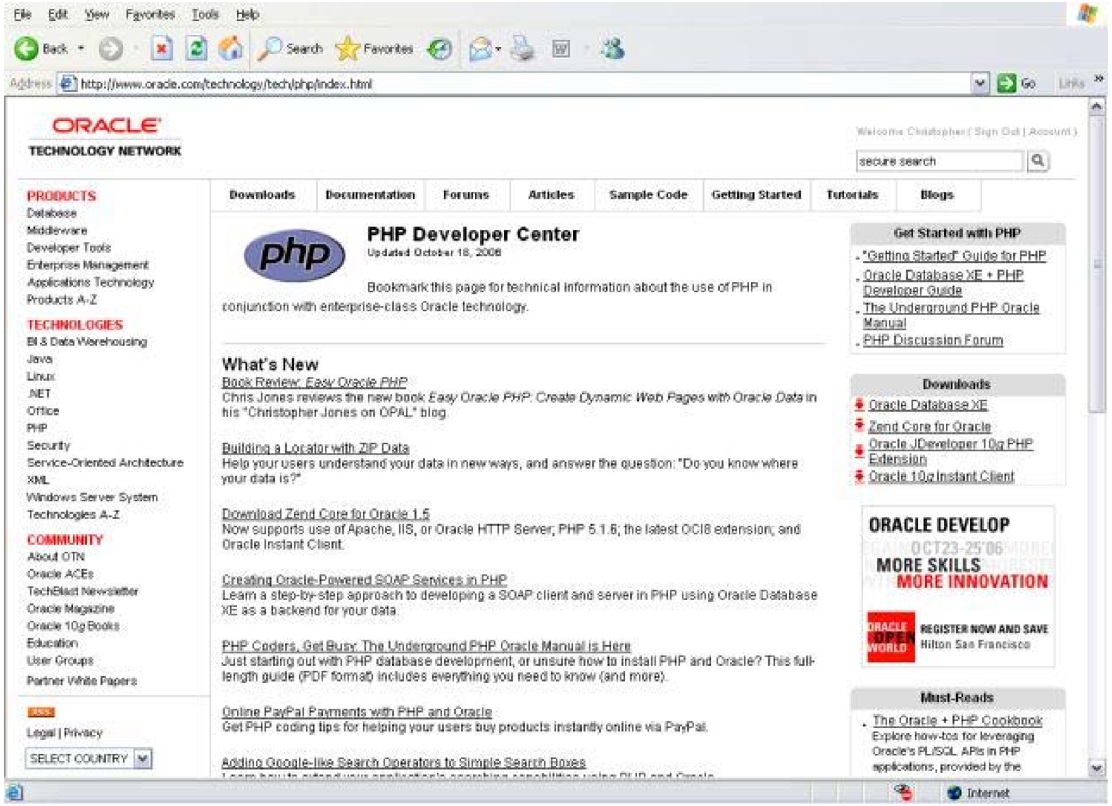

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Updated October 18, 2006

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Downloads

- Oracle Database XE
- Zend Core for Oracle
- Oracle JDeveloper 10g PHP Extension
- Oracle 10g Instant Client

Must-Reads

- The Oracle + PHP Cookbook
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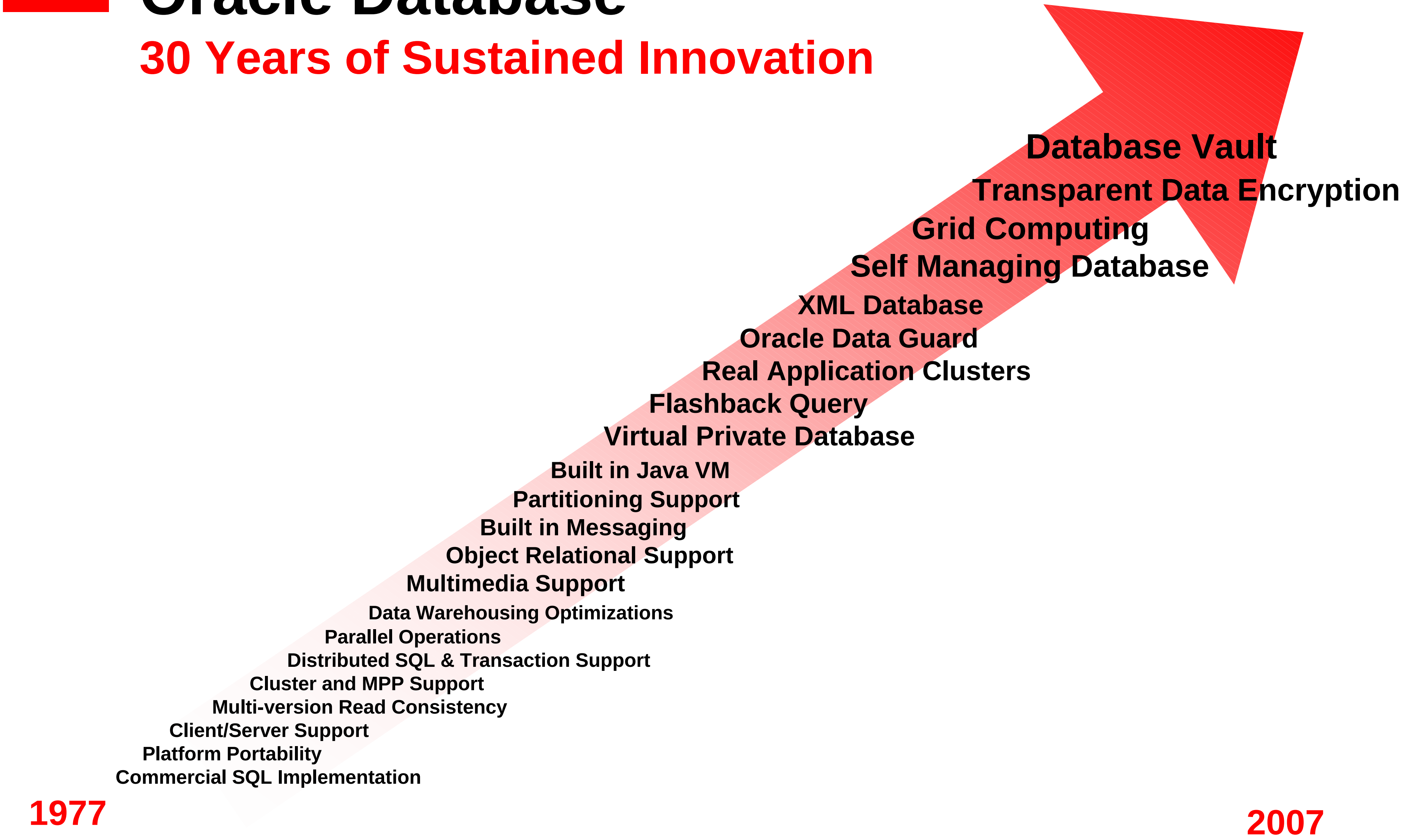

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