Patching Oracle Databases

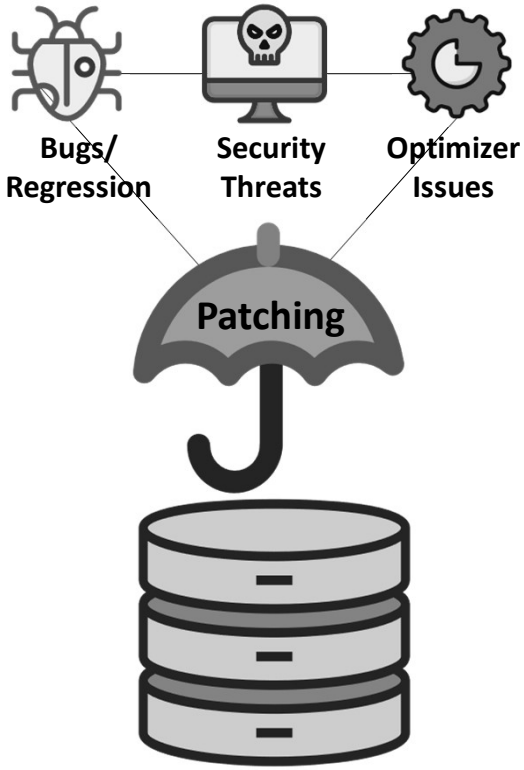
By Ahmed Baraka

Objectives

In this lecture, you will learn how to perform the following:

- Describe Patching Maintenance Types
- Describe types of patches on 12c R1 and prior
- Describe Oracle's Critical Patch Update (CPU) Program
- Describe Patching Strategies (Methods) on Oracle database 12c R1 and prior
- Describe Oracle database version numbers on 12c R1 and prior
- Describe types of patches on Oracle database 12c R2 and after
- Describe Oracle database version numbers on 12c R2 and after
- Understand RU and RUR projection timeline
- Obtain the latest patches for Oracle database
- Apply patches general procedure on non-RAC non-ASM databases
- Use OPatch to apply patches
- Query patch inventory from SQL

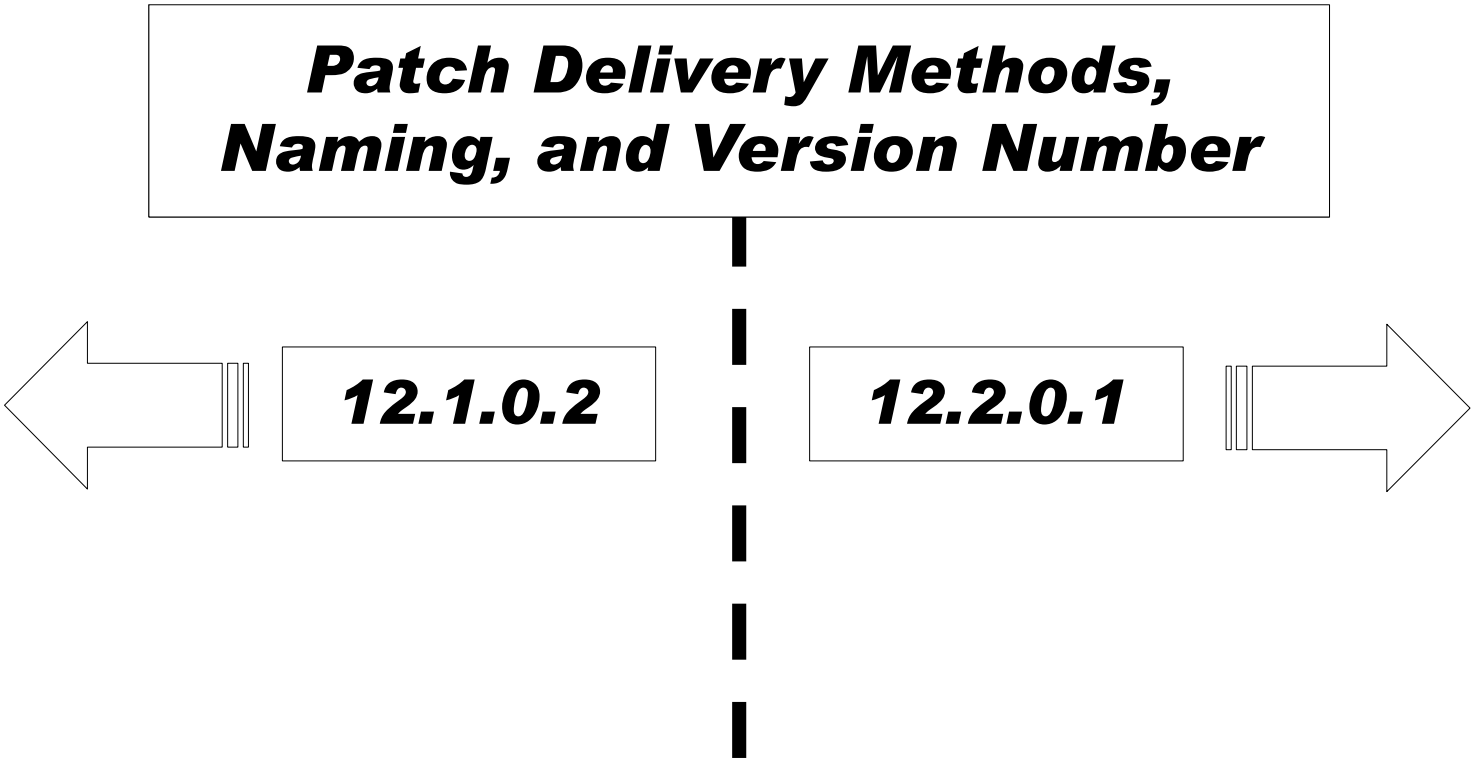
The Target of Database Patching



Patching Maintenance Types

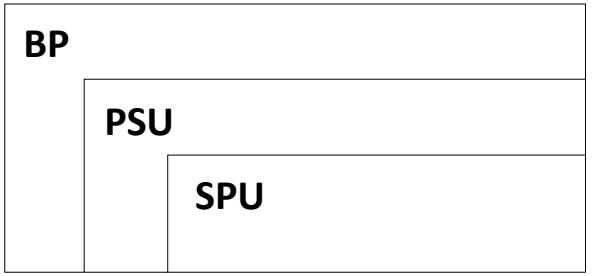
Patching Maintenance Types

- **Reactive**: patches applied as a reaction to fix specific issues
  - Usually delivered as "**Interim Patches**" (historically known as "one-off")
  - Patches provided on demand for a given "defect, version, platform"
  - Go through basic sanity tests
  - Usually included in the next patch set release
- **Proactive**: patches applied on the scheduled maintenance window
  - May contain: bug fixes, security issue fixes, optimizer fixes, and new features
  - Go through extra level of testing
  - Naming convention and version number format have been changing along Oracle database development history


Patch Delivery Methods,
Naming, and Version Number
12.1.0.2
12.2.0.1

12cR1 and older: Types of Patches

- **Security Patch Update (SPU)**
  - a cumulative collection of security fixes
  - delivered on pre-defined quarterly schedule
- **Patch Set Update (PSU)**
  - a cumulative collection of fixes for bugs encountered in the field and security fixes
  - guaranteed not to contain any changes to the optimizer or fixes
  - delivered on pre-defined quarterly schedule
- **Bundle Patch (BP)**
  - a cumulative collection of fixes to address bugs, security fixes, optimizer, and may span multiple stack components: DB and Grid



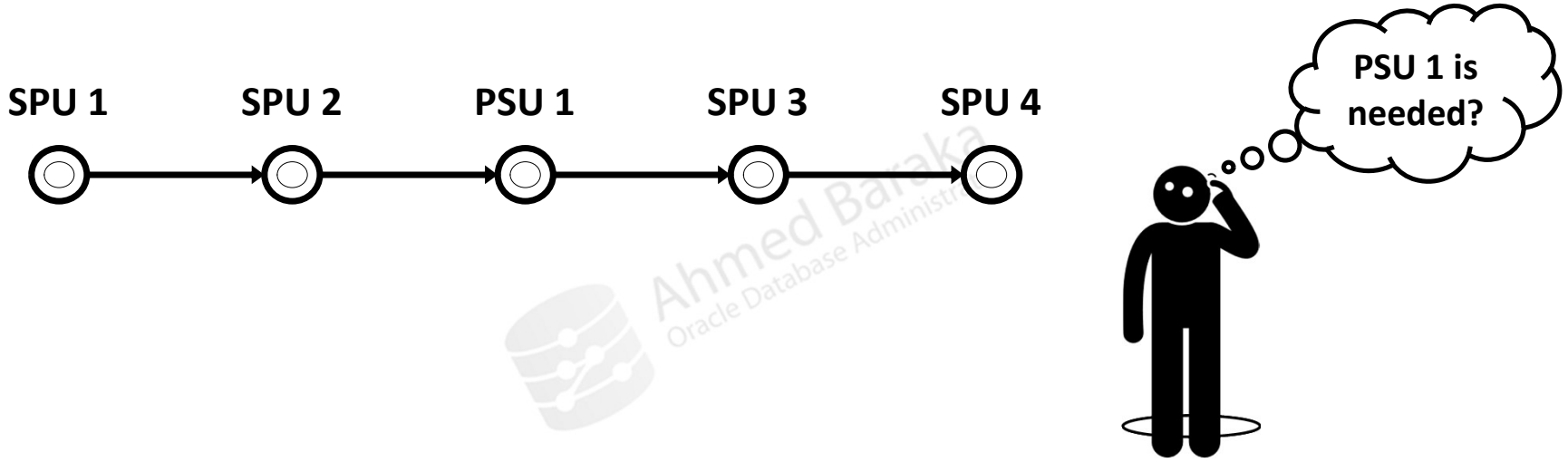
Oracle's Critical Patch Update (CPU) Program

- A program to release patches to cover security vulnerabilities in Oracle product families (currently every quarter)
- Released quarterly on the third Tuesday of Jan, Apr, Jul, and Oct
- For Oracle database:
  - Prior to 12.1.0.2, it is included in the **SPU**s
  - On 12.2.0.1 and onward, it is included in the Release Update Revision patches (**RUR**)
- If a critical security flaw is discovered between the quarterly Critical Patch Updates, a **Security Alert** is released (with a possible interim fix)
- To be notified of the release of Critical Patch Updates and Security Alerts, follow the instructions in MOS note 2813763.1

12cR1 and older: Patching Strategies (Methods)

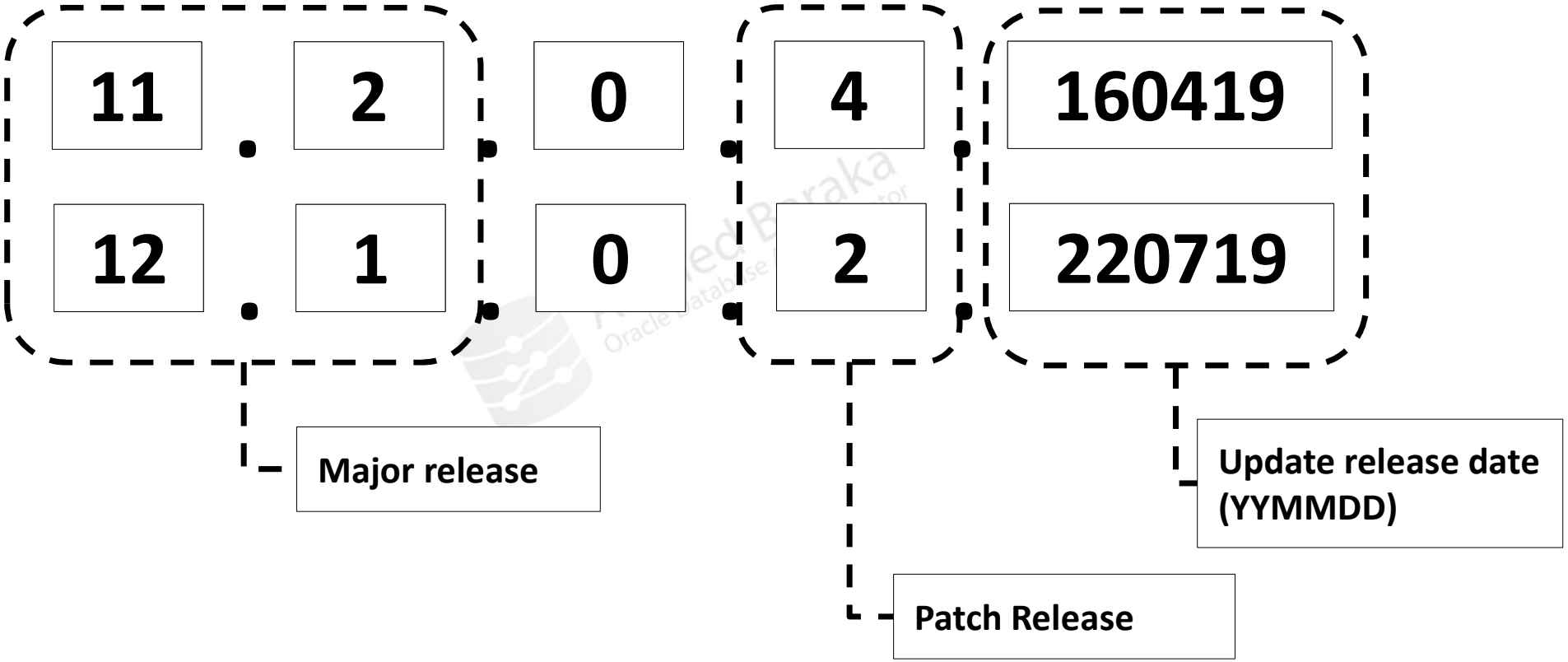
- **SPU (CPU) only**, **SPU/PSU** (recommended), or **BP**
- SPU/CPU Only:
  - Covers security issues
  - Requires basic testing
- PSU requires further testing
- It is not advisable to switch from PSU method to SPU method
- From database BP to SPU is not allowed
- From PSU to database BP is allowed
  - Use the latest version of OPatch utility

The Challenge of Following SPU-Only Method



- If applying a PSU is needed, you might need to rollback some SPUs and the interim patches released after the required PSU (if any)

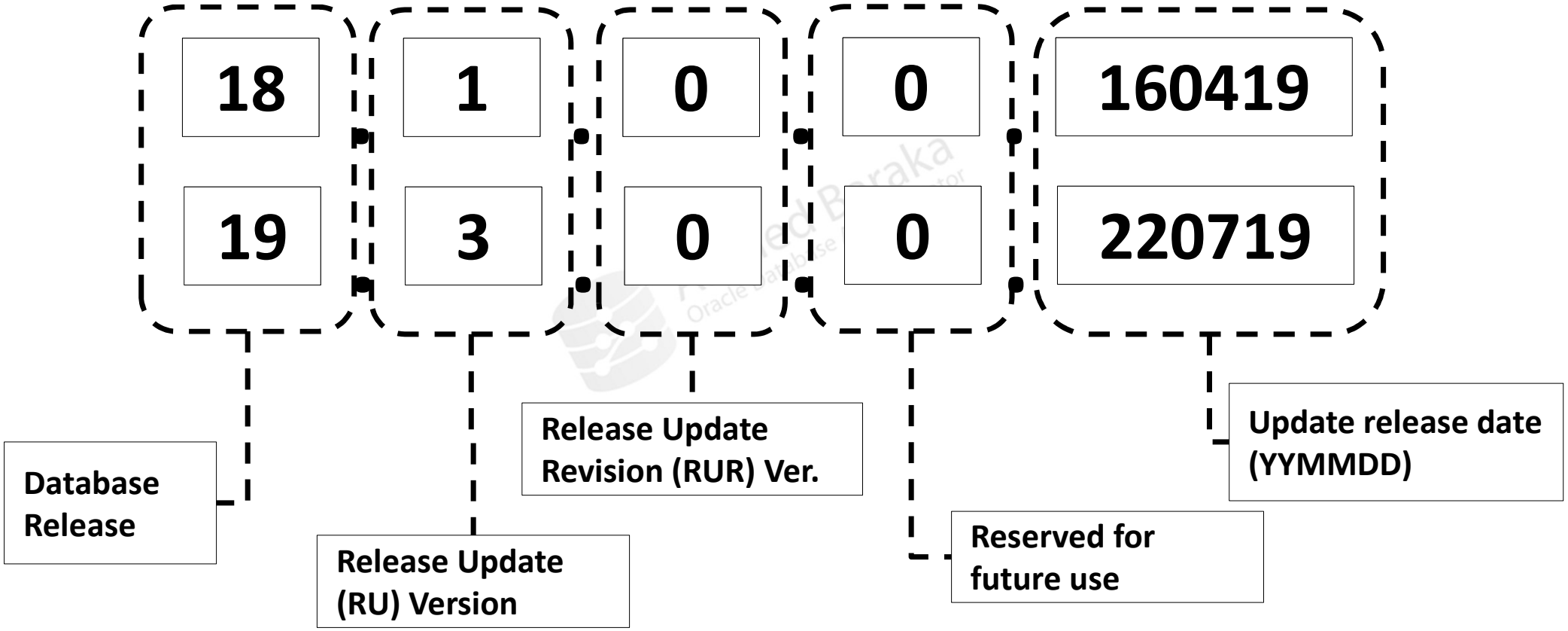
Version Numbers: 12R1 and Prior



12cR2 and later: Types of Patches

- **Release Updates (RU)**
  - Bug fixes, functional, and security
  - Released every quarter
- **Release Update Revisions (RUR)**
  - New security fixes
  - Come out as part of the CPU every quarter
  - 2 RUR are released for each RU

Version Numbers: 12R2 and Later



RU and RUR Projection Timeline Example

2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	
19.2.0								

RU and RUR Projection Timeline Example

2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	
19.2.0	19.3.0							
	19.2.1							

RU and RUR Projection Timeline Example

2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	
19.2.0	19.3.0	19.4.0						
	19.2.1	19.3.1						
		19.2.2						

RU and RUR Projection Timeline Example

2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	
19.2.0	19.3.0	19.4.0	19.5.0					
	19.2.1	19.3.1	19.4.1					
		19.2.2	19.3.2					

RU and RUR Projection Timeline Example

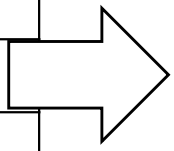
2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	
19.2.0	19.3.0	19.4.0	19.5.0	19.6.0				
	19.2.1	19.3.1	19.4.1	19.5.1				
		19.2.2	19.3.2	19.4.2				

RU and RUR Projection Timeline Example

2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	..
19.2.0	19.3.0	19.4.0	19.5.0	19.6.0	..	..	..	..
	19.2.1	19.3.1	19.4.1	19.5.1	..	..	..	..
		19.2.2	19.3.2	19.4.2	..	..	..	..
					..	..	..	..
						..	..	..
							..	..

Recommended Patching Strategy

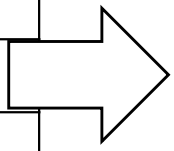
2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	..
19.2.0	19.3.0	19.4.0	19.5.0	19.6.0	..	..	..	..
	19.2.1	19.3.1	19.4.1	19.5.1	..	..	..	..
		19.2.2	19.3.2	19.4.2	..	..	..	..
					..	..	..	..
						..	..	..
							..	..



Apply the next RU each quarter

Alternative Patching Strategy

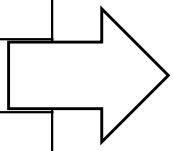
2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	..
19.2.0	19.3.0	19.4.0	19.5.0	19.6.0	..	..	..	..
	19.2.1	19.3.1	19.4.1	19.5.1	..	..	..	..
		19.2.2	19.3.2	19.4.2	..	..	..	..
					..	..	..	..
						..	..	..
							..	..



Apply the first RUR, the second RUR, then the RUs

Alternative Patching Strategy

2019			2020				2021	
April	July	October	Jan	April	July	Oct	Jan	..
19.2.0	19.3.0	19.4.0	19.5.0	19.6.0	..	..	..	..
	19.2.1	19.3.1	19.4.1	19.5.1	..	..	..	..
		19.2.2	19.3.2	19.4.2	..	..	..	..
					..	..	..	..
						..	..	..
							..	..



Apply the second RUR2 only

Patch Product/Component Targets

- Patch possible targets:
  - Database
  - OJVM
  - GI (Grid Infrastructure)
- OJVM could be added to DB or GI in one patch (**Combo**)
- OJVM patches can be applied on database that are patched to at least October 2014 DB PSU (or equivalent SPU or Database Patch for Exadata)
- In Windows, rollback the old OJVM patch, apply the latest **bundle patch**, then apply the latest OJVM patch

Obtaining the Latest Patches for Oracle Database

- You need an account in **Oracle Support** to obtain them
  - Linked to a CSI
- **Assistant**: Download Reference for Oracle Database/GI Update, Revision, PSU, SPU(CPU), Bundle Patches, Patchsets and Base Releases (Doc ID 2118136.2)
- Primary Note for Database Proactive Patch Program (Doc ID **888.1**)
  - Oracle Database 19c Important Recommended One-off Patches (Doc ID **555.1**)
- For obtaining Windows Database Bundle Patches, (Doc ID 161549.2)
- Patches for Oracle database 12.2 and older are password protected

Applying Patches General Procedure on non-RAC non-ASM Databases

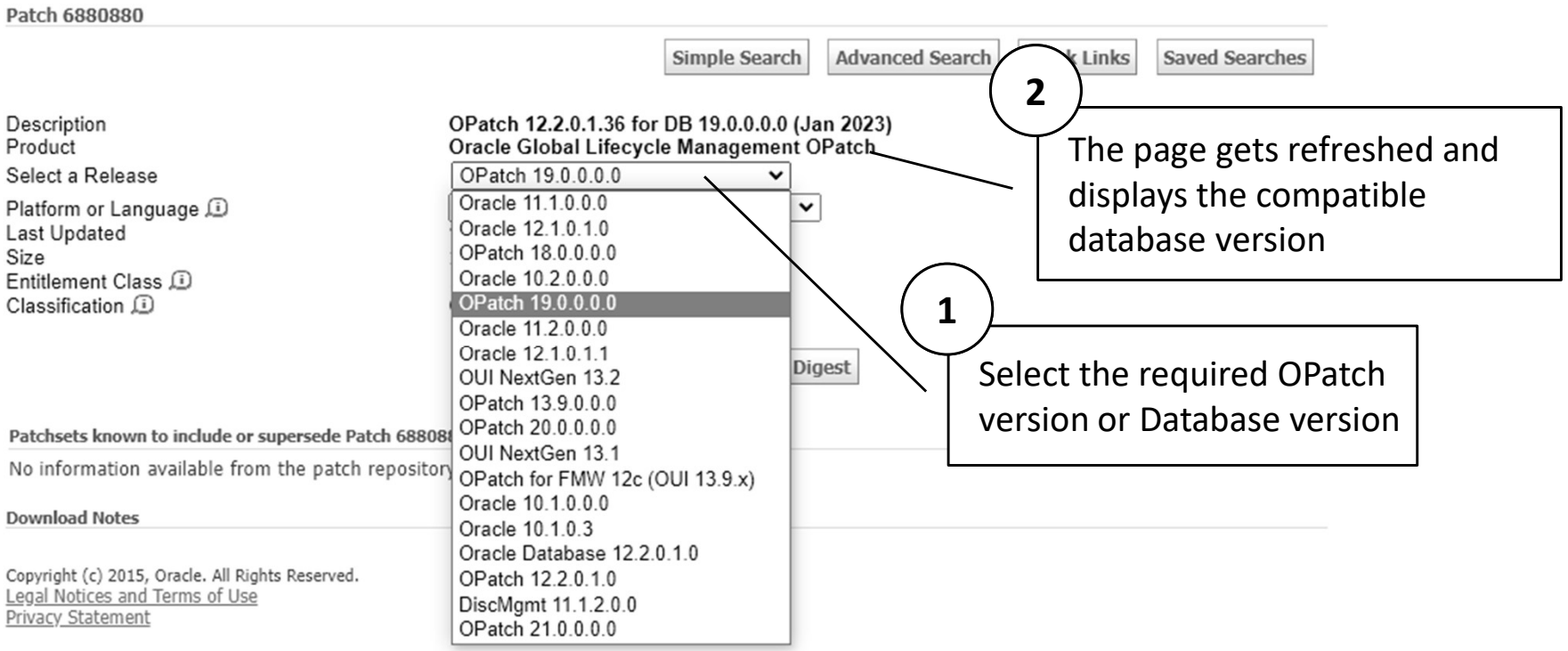
1. Download the required patch file from Oracle Support and extract it into a staging directory
2. Read the associated README file
3. Validate version of current OPatch utility and upgrade it if required
4. Validate conflicting patches
5. Take the backup of $ORACLE_HOME and associated databases of same home (recommended)
6. Disable jobs in crontab and DBMS scheduler jobs, and stop applications
7. Stop all services associated to $ORACLE_HOME
8. Apply DB patch on $ORACLE_HOME
9. Validate applied patch in the inventory
10. If required, apply the OJVM patch
11. Start databases (but not the listener) associated to $ORACLE_HOME
12. If required, execute the datapatch on each database and validate
13. Start all services associated to $ORACLE_HOME
14. Enable jobs in crontab and DBMS scheduler jobs then start the applications

About OPatch

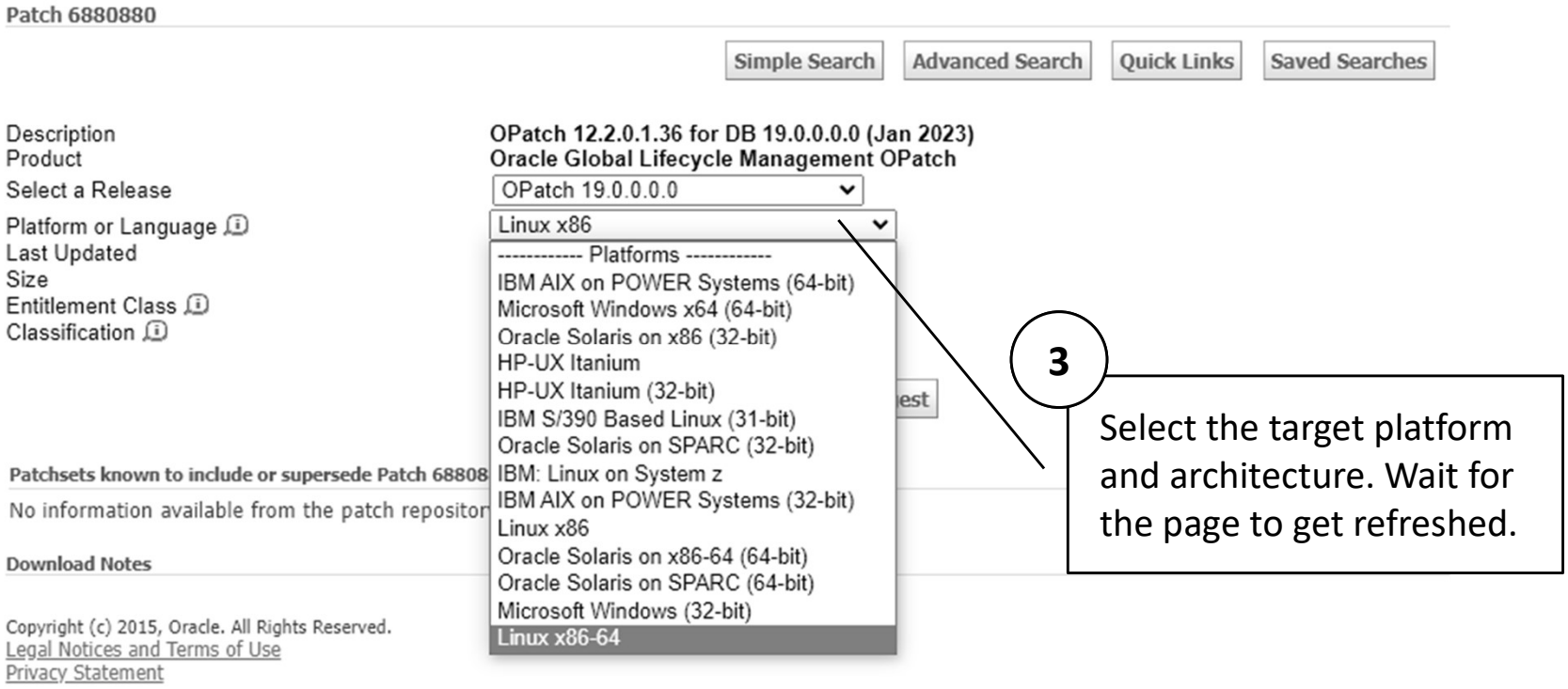
- OPatch is a Java-based utility that assists you with the process of applying patches to Oracle software.
- OPatch is included with the Oracle database and Clusterware homes: in a directory named as **`OPatch`**
- Can be downloaded from the Internet and upgraded separately
- Further information located in Doc ID 293369.1: Master Note For OPatch

Downloading OPatch

- https://updates.oracle.com/download/6880880.html



Downloading OPatch



Preparing the Environment for Using OPatch

- Check the **ORACLE_HOME** environment variable

```
. oraevn
ORACLE_SID = [oracle] ? oradb
ORACLE_HOME = [/u01/app/oracle/product/19.0.0/dbhome_1] ?
```

- Upgrade OPatch to latest version (if needed)
  - Download the latest OPatch version for the current database version (MOS ID293369.1)
  - Delete $**ORACLE_HOME\OPatch**
  - Extract the latest OPatch zip files into $**ORACLE_HOME**
- Update the **PATH** environment variable to include the **OPatch** directory
- Change the current directory to the patch staging directory

OPatch Common Commands

- To know the current OPatch version:

```
opatch version
```

- To list the patches that are already applied to Oracle home:

```
opatch lsinventory
opatch lspatches
```

- To apply the patch (after preparing the environment and changing the directory to the patch staging directory):

```
opatch apply
```

- **Reference**: OPatch User's Guide

Patch Conflict Resolution

- Conflict may rise from applying interim patches in conjunction with RU and RUR patches

```
opatch prereq CheckConflictAgainstOHWithDetail -ph ./
opatch prereq CheckConflictAgainstOH -ph ./
```

- For information about resolving patch conflicts, see the following documents:
  - MOS Note 1941934.1: My Oracle Support Patch Conflict Checker Overview
  - MOS Note 1091294.1: How to Use the My Oracle Support Conflict Checker Tool for Patches Installed with OPatch
  - MOS Note 1321267.1: Database Patch Conflict Resolution

Querying Patch Inventory from SQL

- **DBMS_QOPATCH** package is an interface to view the database patches that are applied
- **DBA_REGISTRY_SQLPATCH** retrieves list of the SQL patches that are applied to the database.

Patching Best Practice

- Follow the Apply-all-RUs approach in a pre-defined schedule
- Apply the patches on a testing environment first
  - If not available, go for applying the RUs
- Keep the number of interim patches installed to a minimum
  - Install interim patches only for specific issues that you know will apply to your environment.
- Engineered systems (like ODA and Exadata) have their own patching methods
- For large IT environments, you can automate the patching process using OEM Cloud Control or a scripting language like Ansible

Mike Dietrich Blog

- Senior Director Product Management, Oracle Database Upgrade, Migrations and Patching
- Follow his blog:

  https://mikedietrichde.com

Summary

In this lecture, you should have learnt how to perform the following:

- Describe Patching Maintenance Types
- Describe types of patches on 12c R1 and prior
- Describe Oracle's Critical Patch Update (CPU) Program
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