

Cloud Premigration Advisor Tool (CPAT) - Overview and Best Practice

Session ID: LTI





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115 minutes – Feb 20, 2021



Episode 3

Performance Stability, Tips and Tricks and Underscores

120 minutes – Mar 4, 2021



Episode 4

Migration to Oracle Multitenant

120 minutes – Mar 16, 2021



Episode 5

Migration Strategies – Insights, Tips and Secrets

120 minutes – Mar 25, 2021



Episode 6

Move to the Cloud – Not only for techies

115 minutes – Apr 8, 2021



Episode 7

Cool Features – Not only for DBAs

110 minutes – Jan 14, 2021



Episode 8

Database Upgrade Internals – and so much more

110 minutes – Feb 11, 2021



Episode 9

Performance Testing Using the Oracle Cloud for Upgrades and Migrations

90 minutes – May 19, 2021



Recorded Web Seminars

<https://MikeDietrichDE.com/videos>



Cloud Premigration Advisor (CPAT)

Overview

What is CPAT?

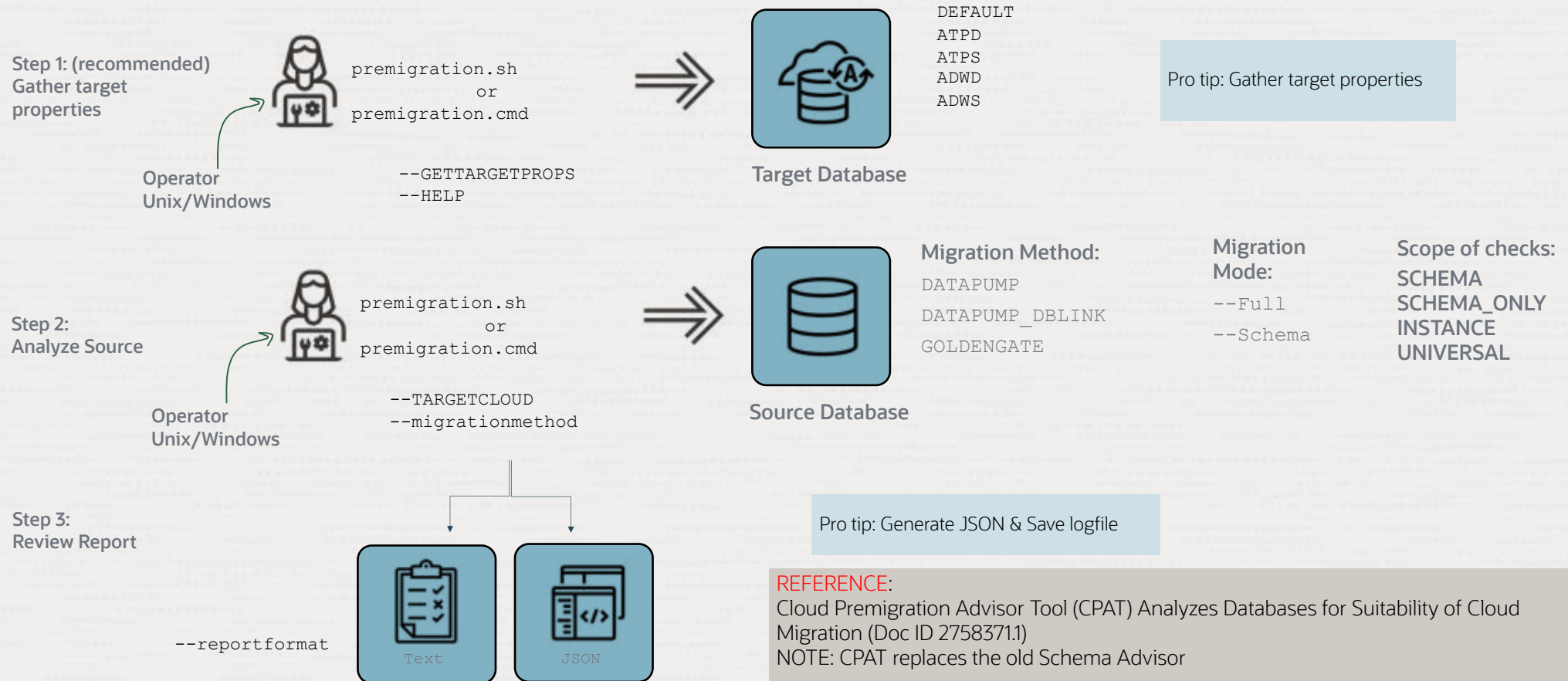
Best Practice

How to Run CPAT

Reading the Report

CPAT| Architecture

A Java-based command line tool that validates a source database for migration to a cloud target



CPAT | Validation Checks

60+ checks identify issues that may interfere with migration of the source database to the cloud

Provide helpful recommendations



Is the feature,
construct, or setting
supported by:

- ✓ Target
- ✓ Migration method
- ✓ Migration mode



Result:

- ✓ PASS
- ✓ INFORMATION
- ✓ REVIEW REQUIRED
- ✓ ACTION REQUIRED



List of relevant objects?

- E.g., a list of tables using multimedia datatypes



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CPAT |Use SQLcl

Download sqlcl

connect

Use the sqlcl command



CPAT | Use DMS and ZDM services

- Oracle Services embed CPAT
 - OCI Database Migration Service (DMS)
 - Zero Downtime Migration (ZDM)
- Apply many CPAT findings automatically
 - E.g., Perform tablespace mapping, directory mapping, pre-create tablespaces if allowed
- Inform CPAT about automated fix-ups, generate “PASS” results for certain checks
- Ensure CPAT is invoked correctly for the type of migration
 - schema vs full
 - online vs offline
 - Etc.
- Provide graphical navigation of CPAT reports (DMS)



CPAT | Take it to fleet scale with CMA

Cloud Migration Analyzer (CMA)

- APEX application to analyze databases for their suitability to migrate to Oracle Cloud platforms
- Aggregate data and advice across a fleet of databases
- Guided approach to answer questions such as
 - Which databases will be easiest to migrate to ADB?
 - What are the most common issues that I should address to ensure successful migration?
- Visualize CPAT results and categories of issues



CPAT |Run standalone

- Start with the MOS note for instructions
- Download (from ARU) and extract (unzip) the tool
- Get target instance properties

```
./premigration.sh -gettargetprops...
```

- Run CPAT on the source instance

```
./premigration.sh --targetcloud <target> --migrationmethod <method>...
```

Report formats

- Default use --reportformat text for human readable output
- Generating --reportformat json is intended for consumption by automation tooling

Help

- `./premigration.sh --help`



CPAT | Demo

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CPAT| Best Practices

Output Format

Output Organization

Target Properties

Schemas vs Full

Limit Output Size

- Default is TEXT output for human readability
- JSON format is useful for completeness and for tooling
- Always use the `--report format` command line option and specify both TEXT and JSON
 - This will generate two reports (both .txt and .json)



CPAT| Best Practices

Output Format

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Schemas vs Full

Limit Output Size

--reportformat TEXT

```
~~~~~
Check Name:  has_refs_to_restricted_packages_serverless
Check Result: Review Required
~~~~~
Description:  Check for references to Packages that are not supported or only partially supported
Failure Impact: Applications that reference unsupported or restricted use packages may fail
Action:       Applications referencing unsupported packages must be modified before migration to ADBS; Applications referencing
              partially supported packages require testing and validation to ensure they only utilize unrestricted functions and
              procedures.

Relevant Objects:
OWNER NAME      TYPE      REFERENCED_NAME SUPPORT
-----
INTG  INTG$CDCTESTIT_DB  PACKAGE BODY UTL SMTP  PARTIALLY SUPPORTED
INTG  INTG$CDCTESTIT_DB  PACKAGE BODY UTL TCP    PARTIALLY SUPPORTED
INTG  INTG$LABEL_LDAPORG PACKAGE BODY DBMS LDAP   PARTIALLY SUPPORTED
INTG  INTG$MAIL_DB       PACKAGE BODY UTL SMTP    PARTIALLY SUPPORTED
INTG  INTG$MAIL_DB       PACKAGE BODY UTL TCP     PARTIALLY SUPPORTED
INTG  INTG$MAIL_DB       PACKAGE BODY UTL TCP     PARTIALLY SUPPORTED
INTG  INTG$UTIL_DB       PACKAGE BODY DBMS LDAP   PARTIALLY SUPPORTED
~~~~~
```



CPAT| Best Practices

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--reportformat JSON

```
{ "scope": "SCHEMA", "name": "has refs to restricted packages serverless", "result": "WARNING", "description": "Check for references to Packages that are not supported or only partially supported", "targetCloud": [ "ATPS", "ADWS" ], "omittedRelevantObjectsCount": 0, "title": "Restricted Packages Use (Shared)", "failureImpact": "Applications that reference unsupported or restricted use packages may fail", "action": "Applications referencing unsupported packages must be modified before migration to ADBS; Applications referencing partially supported packages require testing and validation to ensure they only utilize unrestricted functions and procedures.", "executedSQL": "SELECT OWNER, NAME, TYPE, REFERENCED_NAME, SUPPORT FROM ( SELECT OWNER, NAME, TYPE, REFERENCED_NAME, 'UNSUPPORTED' AS SUPPORT FROM SYS.DBA_DEPENDENCIES WHERE OWNER IN ( 'INTG', 'INTG_READ' ) AND REFERENCED_NAME IN ( 'DBMS_DEBUG_JDWP', 'DBMS_DEBUG_JDWP_CUSTOM', 'UTL_INADDR' ) UNION ALL SELECT OWNER, NAME, TYPE, REFERENCED_NAME, 'PARTIALLY SUPPORTED' AS SUPPORT FROM SYS.DBA_DEPENDENCIES WHERE OWNER IN ( 'INTG', 'INTG_READ' ) AND REFERENCED_NAME IN ( 'UTL_HTTP', 'UTL_SMTP', 'UTL_TCP', 'DBMS_SHARED_POOL', 'DBMS_PIPE', 'DBMS_LDAP', 'DBMS_NETWORK_ACL_ADMIN' ) ) WHERE OWNER <> 'PUBLIC' AND TYPE <> 'SYNONYM' AND NAME <> REFERENCED_NAME ORDER BY 1,2,3,4", "relevantObjectsData": [ { "OWNER": "INTG", "NAME": "INTG$CDCTESTIT_DB", "TYPE": "PACKAGE BODY", "REFERENCED_NAME": "UTL_SMTP", "SUPPORT": "PARTIALLY SUPPORTED" }, { "OWNER": "INTG", "NAME": "INTG$CDCTESTIT_DB", "TYPE": "PACKAGE BODY", "REFERENCED_NAME": "UTL_TCP", "SUPPORT": "PARTIALLY SUPPORTED" }, { "OWNER": "INTG", "NAME": "INTG$LABEL_LDAPORG", "TYPE": "PACKAGE BODY", "REFERENCED_NAME": "DBMS_LDAP", "SUPPORT": "PARTIALLY SUPPORTED" }, { "OWNER": "INTG", "NAME": "INTG$MAIL_DB", "TYPE": "PACKAGE BODY", "REFERENCED_NAME": "UTL_SMTP", "SUPPORT": "PARTIALLY SUPPORTED" }, { "OWNER": "INTG", "NAME": "INTG$MAIL_DB", "TYPE": "PACKAGE BODY", "REFERENCED_NAME": "UTL_TCP", "SUPPORT": "PARTIALLY SUPPORTED" }, { "OWNER": "INTG", "NAME": "INTG$MAIL_DB", "TYPE": "PACKAGE BODY", "REFERENCED_NAME": "UTL_TCP", "SUPPORT": "PARTIALLY SUPPORTED" }, { "OWNER": "INTG", "NAME": "INTG$UTIL_DB", "TYPE": "PACKAGE BODY", "REFERENCED_NAME": "DBMS_LDAP", "SUPPORT": "PARTIALLY SUPPORTED" } ] }
```



CPAT| Best Practices

Output Format

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Target Properties

Schemas vs Full

Limit Output Size

- Use the `--outfileprefix` and `--outdir` switches to keep organized and keep reports from being overwritten

```
./premigration.sh --outfileprefix EBS01 --outdir /path/CPAT_output --reportformat TEXT JSON...
```

- The example creates 3 files in the `/path/CPAT_` folder:
 - `EBS01_premigration_advisor_report.txt`
 - `EBS01_premigration_advisor_report.json`
 - `EBS01_premigration_advisor.log`
- Please include the log file with a Service Request



CPAT| Best Practices

Output Format

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Limit Output Size

use the `--analysisprops <props-file>` command line option when analyzing source instances

- Generate the properties file with the `--gettargetprops` switch and `targetconnection` parameters

```
./premigration.sh --gettargetprops --connectstring  
jdbc:oracle:thin:@atpd_high?TNS_ADMIN=/path/wallet ...
```

```
./premigration.sh --targetcloud ATPD --analysisprops  
premigration_advisor_analysis.properties ...
```

- Get a more complete (and potentially less alarming) report
- REVIEW REQUIRED appears in the report if target properties file is not used



CPAT| Best Practices

Output Format

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Target Properties

Schemas vs Full

Limit Output Size

- Use the `--schemas` switch
 - Know which schemas are required by the app(s)
 - Most CPAT checks are application agnostic.
 - The default set of schemas can find unimportant problems
 - The `--full` switch can find unimportant problems
- Don't use `--schemas` if migrating the whole instance
- Alternative: use `--schemas` and `--full`
 - See the SCOPE section of the CPAT MOS Note



CPAT| Best Practices

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Schemas vs Full

Limit Output Size

- Some checks can have many “relevant objects,” limit using...
 - `--maxtextdatarows 10` for TEXT reports
 - `--maxrelevantobjects N` for JSON reports
- SQL queries for each check can be found in the JSON report
 - `--sqltext` includes SQL queries in the TEXT report
- The JSON report has extra information if you want to deep dive into CPAT operations
- Use a text editor to format the compact JSON report
 - python can help format the compact JSON report

```
python -m json.tool  
demo1_premigration_advisor_report.json >  
demo1_pp_premigration_advisor_report.json
```



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CPAT| Validation Check Severity Levels

Action Required

Review Required

Informational

Pass

- Significant chance that something from the source database will not be migrated to the target (at all)
- A "data loss" situation
- It must be investigated

Example: user data in SYS or SYSTEM will not be imported into an ADB instance



CPAT| Validation Check Severity Levels

Action Required

Review Required

Informational

Pass

- The data should migrate
- but work must done post-migration
 - to make sure everything is working as expected
 - manually bring the target instance in line with the source instance

Example: ILM ADO policies do not get migrated

Example: recreate db links



CPAT| Validation Check Severity Levels

Action Required

Review Required

Informational

Pass

- May not be a check you can ignore
- Depending on the check and use of the feature by an application, an Informational check can be significant

Example: Index organized tables are automatically converted to heap tables but work must be done post-migration



CPAT| Validation Check Severity Levels

Action Required

Review Required

Informational

Pass

The check did not find anything that needs attention



Cloud Premigration Advisor Tool (CPAT) Usage

Top “Action Required” and their impacts/remediation actions

Title	Check name	Remedy
Data in Custom Tablespaces (Dedicated)	has_data_in_other_tablespaces_dedicated	Pre-create custom tablespaces or remap them to the data tablespace in ADB
User Defined Objects in SYS/SYSTEM	has_user_defined_objects_in_sys	Move these objects to a different schema prior to migration
References to User Objects in SYS/SYSTEM	has_refs_to_user_objects_in_sys	Move these objects in SYS/SYSTEM to a different schema prior to migration and recreate the reference
Role Privileges	has_role_privileges	DBA role cannot be granted in ADB, consider alternatives like PDB_ADMIN
ROWID Type Columns	has_columns_of_rowid_type	Can be remedied by setting the ALLOW_ROWID_COLUMN_TYPE initialization parameter in the target environment. Cannot use GG for online migration, nor Data Guard Rolling Upgrade for future version upgrade (NOTE: RAC Rolling Patching is not affected)
Common Objects	has_common_objects	These are not migrated and not supported in ADB. Need to be pre-created as as local objects pre-migration
NLS Character Set	nls_character_set_conversion	ADB is adding support to change character set.
XML Type Tables	has_xmltype_tables	Change the XMLType storage option to BINARY.



ORACLE
CloudWorld

Thank you

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