Oracle Metadata Management (OMM) Solutions

Oracle Metadata Management for Oracle Business Intelligence (OMM4OBI)
Oracle Enterprise Metadata Management (OEMM)

OMM Metadata Management

with Meta Integration® Metadata Management (MIMM)

README for Release Notes, Installation & Setup

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1. Overview

The Oracle Metadata Management (OMM) solutions include two products:
- the Oracle Metadata Management for Oracle Business Intelligence (OMM4OBI)
- and the Oracle Enterprise Metadata Management (OEMM)

Oracle Metadata Management for Oracle Business Intelligence is a software package for metadata management of Oracle environments. Oracle Metadata Management for Oracle Business Intelligence includes the following metadata management features:
- Metadata Harvesting from Oracle technologies
- Metadata Configuration and Stitching
- Metadata Browsing, Search and Reporting
- Metadata Collaboration (external URL, tagging, comments and review)
- Data Flow Lineage & Impact Analysis
- Metadata Explorer (simplified metadata user interface for business users)

Oracle Enterprise Metadata Management is a software package for metadata management of multi-vendor environments and support for data governance. Oracle Enterprise Metadata Management includes all features of Oracle Metadata Management for Oracle Business Intelligence with the following extra metadata management features:
- Metadata Harvesting from multi-vendor technologies
- Metadata Version and Configuration Management (change management)
- Data Model Diagram Visualizer and Navigator
- Business Glossary for Data Governance
- Semantic Lineage & Impact Analysis
- Semantic Mapping Editor
- Data Flow Mapping Specifications Editor

The above Oracle Metadata Management Solutions are implemented by Meta Integration® Metadata Management (MIMM) Web Application Server, based on a Meta Integration® Repository (MIR) database server, and the Meta Integration® Model Bridge (MIMB) metadata harvesting components.

2. Copyright Notice

The following Oracle Metadata Management (OMM) products:

- Oracle Metadata Management for Oracle Business Intelligence (OMM4OBI)
- Oracle Enterprise Metadata Management (OEMM)

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These Oracle Metadata Management products are based (re-branded OEM) on the following Meta Integration products:

- Meta Integration® Metadata Management (MIMM)
- Meta Integration® Model Bridge (MIMB)
- Meta Integration® Repository (MIR)

which are licensed under the following Meta Integration copyright:

3. Release Changes

OMM 12.2.1.4.0 based on MIMM OEM 10.1.0 (01/31/2020)

- NEW METADATA REPORTING DASHBOARDS
  with full BI reporting dashboard capabilities (tile layout, widgets for containers, numbers, statistics such as grids, bar or pie charts, etc.) based upon the new Metadata Query Language (MQL) and Worksheets technologies released in the previous version.
  MQL based Metadata Worksheets combined with other dimensions (e.g. history/time, users/groups, configurations, etc.) enable users to produce powerful dashboards (e.g. recently approved terms, what's new, workflow to do list, etc.).
  As with Collections and Worksheets, users have the ability to save/manage/share Dashboards.

- NEW UI CUSTOMIZATION
  based on the above new dashboard technology, allowing users to customize the UI:

  - for each Repository Object (e.g for Terms, Tables, Columns, etc.) where the Overview Tab is now fully editable as a dashboard, and all other Tabs can be individually hidden to simplify the UI for business users.
    Administrators can manage the Default Overview for different metadata presentation to different user groups.

  - for each Configuration Home Page (now available by clicking the banner logo) which is now based on the full power of new dashboards.
    Administrators can manage the Default Dashboard for the home page of different user groups.

- NEW UI LOOK & FEEL
  dramatically improving the user experience:

  - New Header Banner:

    - Simpler customization harmonized between Metadata Explorer and Manager (conf\resources\MM.properties).

    - Simpler modern top right menus:

      - Tool submenu with access to other tools (e.g. Metadata Manager) and Help.

      - User submenu with direct access to edit the user account profile (e.g. define full name, email, and now with photo avatar), preferences, and log out.

      - Configuration submenu with direct access to the default, recent and other configurations.

  - New Header Menus with Objects, Collections, WorkSheets, Dashboards, and Manage with harmonized SubMenus to Explore, Manage, and direct access to Favorites and Recent.

  - New Explorer Panel (on the left for navigation) which is now available (harmonized) for Objects, Collections, WorkSheets, and Dashboards.

  - New Object Level Attachments such as associating documents to a Term, Table or even Column.

- New Object Preview Thumbnail Image manually uploaded by users, or automatically imported by some bridges (such as a BI Report Preview Thumbnail Image when supported by BI import bridges like Tableau and Spotfire).

- New User Avatar (photo).

- New User Authentication Management UI harmonized between Native, LDAP, OAuth, and SAML.

- New End User's Active Operation Monitoring (see below for details)

- New Administrator's All User Active Operation Monitoring (see below for details)

- Improved Configuration Management (Build) UI (see below for details)

- Improved Column/Field Order to physical order by default (instead of alphabetical order) for table columns and file fields (Note that the model must be fully re-harvested to get the new physical order).

- Improved Data Flow Lineage filtering performance now performed locally on the web client, also reducing the server load.

- Improved Management UI for Users, Groups, etc. with a harmonized simpler UI.

- Improved overall layout, graphics (icons) and presentation.

- NEW UI INTERNATIONALIZATION
  with the ability to translate all the UI menus of both the Metadata Explorer and Metadata Manager including:

  - The MIMB Metadata Profile based UI (metamodel vocabulary: e.g. schema, table, column, field, dimension, job, etc.)

  - The MIMB Metadata import/export bridge UI (bridge parameter names, enumeration values, and descriptions/tooltip)

  The internationalization supports automatic detection of the user's web browser local language, including support for multiple languages on connected web clients. However, Internationalization excludes support for multi language content at once (e.g. support for user defined business names and descriptions in both English and French on the same object within a server)

- NEW ACTIVITY MONITORING / OPERATION MANAGEMENT
  with real time monitoring of any activity such as concurrent model imports (metadata harvesting), a configuration build, and other operations such as a repository backup/restore.
  From the UI perspective, a new activity processing icon (spinning gear) appears on the top right of the banner with a counter of concurrent operations. When all operations are completed (no longer active), the gear icon stops spinning. If there was any error in any of the operations, the operation counter is replaced by a red error icon.
  At any time, a user can click on the activity monitoring icon to list the operations, and jump to the desired log, before closing/discarding the activity icon upon completion. Note that only the activities/operations running on behalf of the current user are displayed. In addition, Administrators also have a new Manage/Operations panel to list any active operations running on behalf of any user.

- NEW NEW REPOSITORY MANAGER
  (Manage > Repository) has been fully redesigned to replace the legacy Metadata Manager UI.
  Over the past few versions, any new features were developed (and therefore only available) in the modern Metadata Explorer UI. At the same time, all editing capabilities of the legacy Metadata Manager were progressively migrated (while redesigned) into the modern Metadata Explorer UI. The last editing feature was the Semantic Mapper now available in the Metadata Explorer of this new version. All remaining other features (the model version management itself) of the legacy Metadata Manager UI have now been migrated, redesigned and improved as Manage > Repository. Links from the Metadata Explorer to Show in Metadata Manager have been replaced by show in Repository Manager. Therefore:

  - The legacy Metadata Manager UI is no longer linked anywhere from the Metadata Explorer UI. New MIMM users should never be exposed to the legacy Metadata Manager UI. The legacy Metadata Manager UI remains bundled in this version as MM/Manager in the URL However, it is deprecated and will be fully removed in the next version.

  - The so called Metadata Explorer UI is now the sole UI as just MM in the URL (instead of MM/Explorer)

- IMPROVED VERSION AND CONFIGURATION MANAGEMENT
  with incremental stitching dramatically accelerating the re-building of configurations based upon the incremental harvesting of multi-models from DI/ETL servers, BI servers (like Tableau), Data Lakes (HFDFS, Amazon S3, etc.), and now large Data Warehouses (Hive, Teradata. Oracle, etc.)

  - New Configuration Build UI preventing concurrent configuration builds, and provide better configuration status updates.

  - New Configuration Model Connection Stitching UI to support the new multi-model databases, including:

    - The 2 levels (Database Model, and Schema) of traditional databases server like Oracle, HIVE.

    - The 3 levels (Database Model, Database Catalog, and Schema) of Microsoft SQL Servers.

  - Improved Configuration Connection UI harmonization between Metadata Explorer and the Manager Manager.

  - Improved Change Management Detection by no longer relying on the physical native id of the object (e.g. table) and instead rely on the name space (e.g. schema/table/column), therefore preventing invalid change detection when the database was re-created (backup/restore), or when pointing from development to production server.

- ARCHITECTURE, DEPLOYMENT & INTEGRATION

  - Improved User Authentication Management (in particular OAuth and SAML) to support the latest version in these standards, and their implementations in popular servers like Azure ADFS.

  - Improved Repository Database Space needed with incremental harvesting of the database servers that are now supported as multi-models at the schema level, as every harvested new version will reuse the stable schema sub-models.

  - All Third Party & Open Source Software has been upgraded to the latest versions for better security vulnerability protection.

- UPGRADE REQUIREMENTS:

  - No specific migration preparation steps are needed as this version upgrade is compatible with the previous one, however:

- As with previous upgrades make sure you follow proper upgrade steps including applying the current version's latest cumulative patch, making sure the database maintenance is up to date, and a full database backup has been performed.
- You must perform a clean install of the new software (i.e. this us is not a cumulative patch on top of previous version)

- POST UPGRADE:
  - UI Customization:
    Any existing customization of the UI Banner (conf\resources\MM.properties) or Metadata Explorer (conf\resources\MetadataExplorer.xml) needs to be manually copied to the newer simpler harmonized version of that file (from conf\Template\resources)
  - Database Models:
    After the upgrade, any newly created database model will be harvested as a multi-model by default. However, existing database models will go on been harvested as single (large) models. In order to benefit from the new faster and more space efficient multi-model databases, the existing database models can be upgraded using a dedicated operation (Migrate to mult-model databases) which is available at the database model or directory level (in the Repository Manager). This conversion operation converts the single database model into a multi-model database (one model per schema) while taking care of the migration of the database documentation (business names, descriptions, etc.), connection stitching, and any involvement on data flow or semantic mappings. Note that this conversion operation has the following known limitations:
    - When a single-model database content has multiple versions the migration process migrates the latest version only. You can find other versions in the original single-model content moved under the migration folder. These versions will retain relationships to mappings and configurations that use them.
    - Web browser bookmarks of objects in the migrated single-model contents are obsolete as they reference these objects using obsolete identifiers.
    - Migrated contents retain names (paths) of the original contents but not their identifier. For example, it can invalidate references to single-model objects in Worksheet filters
    - Only Diagrams with objects in the same schema are migrated.
    - Configuration Architecture diagrams layout of migrated objects could be lost
    - Migrated Data Mapping will not have previously broken target expressions

OMM 12.2.1.3.1 based on MIMM OEM 10.0.1 (04/24/2019)

- NEW METADATA QUERY LANGUAGE (MQL) & METADATA REPORTING WORKSHEETS:
  - New METADATA QUERY LANGUAGE (MQL)
    allows users to define powerful and complex metadata queries with the familiar SQL syntax. The MQL is available through the REST API and constitute the foundation of a brand new Metadata Reporting UI.
  - New METADATA WORKSHEETS
    based on the new Metadata Query Language (MQL) and a brand new UI. Users start from simple search and powerful filters (automatically building MQL queries) to produce a set of metadata on which the user can select the desired columns (metadata properties) to create/save a Worksheet.
    - Worksheets can be shared with other users (of selected group), and easily managed with quick access to Favorites and search for worksheets shared by other.
    - Worksheets implement the Metadata Tabular Reporting (Grid Mode) solution, and can be switched to simple business friendly reports (List mode). Worksheets are also foundations (building block) or the total metadata reporting solution which includes Dashboards in the next version.
    - Worksheets are a lot more powerful than static reports, they allow users to dynamically interact by refining filters, sorting columns, etc.
      In fact, Worksheets also implement the powerful Metadata Bulk Editing capabilities, allowing users to search/filter and easily set some common properties (including custom attributes).
- IMPROVED USER INTERFACE EXPERIENCE:
  - New CUSTOMIZABLE HOME PAGE
    based on an open source sample of a tile based home page with customizable JSON files with short cut icons with internal or external URL, MQL based reports, etc.
    Warning: this custom code home page approach is only a short term solution as it will be replaced by the new official full Dashboard capabilities of the next version.
  - New METADATA EXPLORER MENUS
    have been redesigned to replace the BROWSE menu based on the new metadata reporting capabilities (now with worksheets and soon dashboards) where all existing capabilities (and new ones) have been organized as follows:
    - HOME
      has been removed from the menu bar (to gain space), and replaced by clicking on the top left home logo.
    - A new EXPLORER PANEL
      is available on the left side as a pull down arrow menu (the explorer panel can be pined) which emphasizes navigation using a various organizational structures presented as a hierarchy (tree or drill down). The Explorer Panel offers quick access to metadata through:
      - The Browse tab offers tree navigation from the root of the repository deep into one or multiple models on a single simple tree. It also supports tree browsing from the technical perspective organization of the entire repository, or from the business driven organization of a given configuration. The tree navigation can be set to drill navigation when you need to work with a long list of siblings (e.g., 10K of tables in a database schema).
      - The Search tab offers quick access to metadata query/filters and even save them as reporting worksheets (see above).
      - The Collections tab offers quick access to predefined metadata Collections (see below).
    - OBJECTS
      allows users to search for metadata objects, manage (view, build, favorites, share with me) metadata object collections, look at recently accessed objects (history), browse by object categories (e.g. databases, files).

- - - **WORKSHEETS**
      allows users to manage (view, design, favorites, share with me) metadata reporting worksheets, look at recently accessed worksheets (history), quick access to favorites, dynamically create worksheets by categories and sub categories (e.g. databases / tables / columns)
    - **DASHBOARDS**
      will be available as part of the next version.
    - **MANAGE**
      remains unchanged (for administrators only).
  - New METADATA COLLECTIONS
    re-branding the previous concept of Lists and harmonizing it with the new Worksheets in terms of UI usage and management.
  - Improved GRAPHICAL LINEAGE DIAGRAMS
    with better layout for improved object readability and data flow navigation.
- ARCHITECTURE, DEPLOYMENT & INTEGRATION
  - New SSO Authentication with SAML 2.0
    has been added (in addition to OAuth 2.0 added in the previous version). SAML (Security Assertion Mark-up Language) is an umbrella standard that covers federation, identity management and single sign-on (SSO). In contrast, the OAuth (Open Authorization) is a standard for, color me not surprised, authorization of resources. Unlike SAML, it does not deal with authentication.
  - Oracle JDK has been replaced by OpenJDK 11.
  - All Third Party & Open Source Software has been upgraded to the latest versions for better security vulnerability protection.
- UPGRADE:
  - There are no upgrade specific steps as this is a minor version upgrade fully compatible with the previous repository. However, you must perform a clean install of the new software (i.e. this us is not a cumulative patch on top of previous version)
  - Some java bridges depend on the tool's SDK which is not necessarily compatible with OpenJDK 11 which is now the default JRE for the bridges (typically these tool's older SDK can only work with older versions such as Java 8). In such case the bridge tries to automatically run with the JRE bundled with the tool software / SDK instead. When this is not possible, the bridge offers the ability to manually point to a compatible JRE in the bridge's Miscellaneous parameter. Bridges for tools having compatibility issues with OpenJDK 11, include at least Oracle Data Integration, and SAP BusinessObjects.

OMM 12.2.1.3.0 based on MIMM OEM 10.0.0 (09/21/2018)

- BRAND NEW USER INTERFACE EXPERIENCE:
  - METADATA MANAGER VS METADATA EXPLORER UI:
    - In previous OMM versions, the OMM Web Application Server has offered two different User Interfaces (UI) targeting different user communities. The original Metadata Manager UI was designed for the advanced technical users with a traditional development tool layout including multiple panels: tree structure on the left, multi-tab windows in the middle, attributes on the right, and log activities at the bottom. The Metadata Manager UI also presents the highest level of details and complexity of all harvested metadata. The Metadata Explorer UI was initially introduced as a read only UI with simpler metadata for business users offering an easy to use layout for multiple devices, including tablets. The Metadata Explorer became the new UI platform for all new editing capabilities such as the business glossary or data modeling.
    - With OMM v12.2.1.3, all other editing capabilities are now available in the Metadata Explorer UI, including data mapping, enterprise data architectures (Configuration editor and model stitching), and even the Administration features like Custom Attributes which are now under are now available in the Metadata Explorer UI > Manage > Custom Attributes. Consequently, the Metadata Manager UI is now only necessary (and therefore available) in the OMM Advanced Editions for repository management (with multi version and configuration management). The OMM Standard Edition v12.2.1.3 is now fully implemented in the Metadata Explorer UI where Manage > Content allows users to directly create models to the default single configuration, import metadata, stitch models (connections), and trace lineage right away.
  - METADATA HOME PAGES:

    New metadata home pages with multiple top tabs offer quick access to all key information:
    - The first tab is always the Overview tab which provides a dashboard to all critical information and properties.
    - The next set of tabs are specific (metamodel / profile driven) to the type of object, for example:
      - Database Table objects have tabs for Columns and Constraints.
      - BI Reports (like Tableau Workbook) objects have tabs for Dashboards, Worksheets, and Data sources.
    - The next set of tabs are for the common critical metadata analysis:
      - DATA FLOW for data lineage and impact analysis.
      - RELATIONSHIPS for detection, management, and curation of relationships (see new features below)
      - SEMANTIC FLOW for definition and usage perspectives (see new features below)
    - The last set of tabs are for common documentation and administration like: Comments, Attachments and Audit Log.
  - METADATA QUICK ACCESS:

    Much improved ways to quickly access the right metadata:
    - SEARCH has been massively improved in both real time performance (now based on Lucene) and in functionality as a metadata driven search with natural language semantic search (see new features below)
    - BROWSE has also been massively improved in both performance (now also Lucene based) and in functionalities as a metadata asset type driven browser with support for hierarchical display at all levels of any data sources including database, DI, BI, Data Lakes, and even No SQL (like JSON

hierarchal structures)

- Enterprise ARCHITECTURE driven graphical navigation allows users to drill down from a top down big picture of the enterprise architecture.

- METADATA REPORTING:

Brand new powerful unified metadata reporting capabilities where both search and browse end up to the same reporting page which is also directly available at Browse > Report. Starting from search simply predefines the text filtering (e.g. customer), while browsing predefines a category (e.g. database / tables), and direct access to reporting does not predefine anything.

- The reporting capabilities offers to select multiple categories (e.g. database / tables + Flat files) and subset by content (My Data lake + Sales DW database) before drilling down with the following filters:

- Then filtering is available for Last Modified, Stewards, Labels, Semantic Types, Endorsed By, Certified By, Created By, Warning By, and Commented By.

- Finally, more custom filtering per attribute (including custom attributes) common to the metadata subset (e.g. SecurityLevel = Orange).

- Reports can be reused by saving the URL as favorites (further versions will support full report management within the application)

- METADATA USER LISTS:

Brand new user list management feature allows users to define and mange lists of metadata objects. Just like labels, lists are available anywhere in the UI to add/remove objects, bulk editing, and management. Lists can contain any type of metadata such my favorite list of terms, tables, or reports. Lists can also can contain multiple type of content such as my to do list with terms, tables, and reports in that list. Lists can be shared with other users when marked as public, such as our quarterly review list. Note that lists are flat, therefore not hierarchical and with no sub-list or include concepts.

- METADATA TAGGING WITH LABELS:

The metadata tagging with labels has been much improved to be harmonized with the brand-new list management experience in order to facilitate adding/removing objects anywhere, grid editing, and more.

- METADATA DOCUMENTATION:

Much improved ways to document metadata:

- MULTI-LINE TEXT has been introduced (in addition to the previous single line Text for better formatting and layout. In addition, Multi-Line text has been enhanced with support for URL links and embedded image attachments using a JIRA like syntax. Multi-Line Text is not only the default format for all Descriptions and Comments, but is now also available as a new type of Custom Attribute that can be applied to any metadata for documentation.

- RICH TEXT Documentation with (WYSIWYG) Visual Edition is not only the default medium for Glossary Term documentation, but is now also available as a new type of Custom Attribute that can be applied to any metadata for documentation.

- SQL TEXT of SQL View, Stored Procedures and more are now better presented with colored syntax and optional reformatting. Note that this is not a new type of custom attribute but any predefined attribute with SQL is better formatted.

- ATTACHMENTS (such as pictures, documents, etc.) have been enhanced as part of its integration with the new Metadata Explorer, including Management (Drag and Drop), Preview, and Thumbnails that can be embedded in the Text (and Multi-Line text) descriptions, comments and custom attributes.

- DATA CATALOGING

- Brand new Data Cataloging applications well integrated with the existing Data Governance (DG) capabilities, and based upon the solid Metadata Management (MM) foundations with full data linage and powerful metadata version and configuration management.

- Managing both modern cloud based data lakes and classic Data Warehouse (DW) Enterprise Architectures

- Harvesting metadata from both modern (XML, JSON, Avro, Parquet, ORC) files, Hive tables, and Kafaka messages), and classic (relational tables / CSV files) data technologies

- DATA MODELING AND DOCUMENTING ANY HARVESTED METADATA

- In OMM v12.2.1.2, existing data stores such as RDBMS could be harvested as a Physical Data Model (PDM) instead of a simple Model, in order to offer full documentation including business glossary term reuse based upon automatic semantic links, reverse engineering based upon naming standards, data modeling with diagramming, and of course automatic change management (re-harvest/compare/merge).

- In OMM v12.2.1.3, all the above capabilities are now available on any harvestable model content without having to create a PDM. In other words, any data integration, business intelligence, reports, data stores (relational, hierarchical, NoSQL, files, etc.) can be documented at as needed, including support for relational data models. Consequently, all existing PDM in OMM v12.2.1.2 may be converted to Models in OMM v12.2.1.3 without loss of any existing documentation (including diagrams).

- The documentation (business names and definitions) process has been improved allowing any object (e.g. table, column, report field) to be quickly and easily:

- "Classified" with a local semantic link to a glossary term, without having to use an intermediate Semantic Mapping content, or associating the Model to a Glossary as with the PDM.

- "Documented" with a local business name and definition overwriting any Semantic link (Classified, Mapped or Inferred)

Furthermore, this documentation process is also dramatically enhanced through the integration with a new "Semantic Flow" tab acting as an interactive dashboard on finding the right definitions (see below).

- When harvested databases that are already documented in data modeling tools (e.g. Erwin), such data models can be imported as a separate model and automatically stitched directly to its matching harvested database (without using any semantic mapping model). The semantic stitching is automatically maintained as both the database and its associated data model are independently re-imported/refreshed on regular basis (the stitching will report inconsistencies). From the user perspective, the documentation (business name, descriptions, relationships, diagrams) of any harvested database table / column is automatically inherited from its associated data model.

- RELATIONSHIPS Discovery & Management

- Relationship Discovery using the following methods:
  - Automatically "Inferred" based on:
    - Metadata Usage Driven: using the surrounding data flow usage such as joins in DI (ETL Tools, SQL Scripts or Data Prep) and BI (traditional or self-service) activities.
  - On Demand "Detected" based on:
    - Metadata Name Matching: for example PurchaseOrder.SKU = Product.SKU or Customer.AccountId = Account.Id)
    - Semantic Definition Matching: classified by users to the same glossary term.
- Relationship Management with user defined relationships and social curation (e.g. endorsed or certified joins)
- Dynamic Data Model diagram generation from Relationships surrounding any object (e.g. table or file).

- SOCIAL CURATION
  - Endorsement, warnings, certifications with impact on search ranking.

- SEMANTIC SEARCH
  - Metadata driven search language such as "Customer tables" for any tables with Customer in the name, "tables with SSN" for any table with a SSN column (e.g. for GDPR), or "ROI in Reports" for any reports containing ROI.

- SEMANTIC MAPPING
  - Major improvements in semantic mapping including in place semantic mapping via two approaches:
    - Top-down from Business Glossary Term or Data Model Entity/Attribute,
    - Bottom-up from Data Store Tables/Columns or Report Fields.

- SEMANTIC FLOW
  - Major improvements on the semantic flow analysis now also supporting the documentation process acting as an interactive dashboard for finding definitions that are:
    - "Local" (within the Model) that has been either "Imported" (metadata harvesting) or locally "Documented" (edited description overwrite),
    - locally "Classified" (within the Model) to an external glossary term,
    - directly "Mapped" via a Semantic Mapping Model or direct stitching (e.g. between a database and its data model),
    - indirectly "Inferred" through complex data flow pass through and semantic flow (which can be graphically analyzed in the data flow diagram), or
    - "Searched" for by name in all glossaries.

    Any of the Searched, Inferred or Mapped definitions may quickly (in place) be reused/promoted as a Classified or Mapped definition.

- RELATED REPORTS
  - Related Reports are now available on any metadata objects such as files, tables, columns, etc. (instead of just business terms). This allows business users looking at the result of a search to have direct access to a simple list of any related reports in any BI tools (crossing all semantic and data flows without exposing any of the complexity to business users) Such reports can then automatically be opened in their respective BI tool technologies, therefore acting as a multi-vendor BI tool web portal for business users.

- DATA CONNECTIONS / METADATA STITCHING
  - Complete support for file format harvesting and stitching.
  - Connection pool factorization (e.g. from DI and BI servers) to minimize the number and complexity of stitching connections.

- DATA MAPPING Specifications & Design
  - The Data Mapping Specifications and the Data Mapping Designs have been fully resigned and merged into brand new Data Mappings that can be used for multiple purposes, including capturing data flow mapping requirements.
  - The Data Mapping tool allows for the mapping of multiple source data stores into a target data store in multiple steps with (schema or table level) Bulk Mappings and (column/field level) Query Mappings. The data mapping tool offers new graphical mapping visualization as you map, and new expression syntactical editors when designing joins, lookups, filters, etc.

- ARCHITECTURE, DEPLOYMENT & INTEGRATION
  - Search engine re-designed and optimized with Apache Lucene offering near real time metadata search and navigation (and removing any dependencies of underlying database text search requirements)
  - Third party software upgraded to the latest of Java 8, Apache Tomcat 9, and more for security and performance improvements.
  - Single Sign On (SSO) integration architecture has been redesigned for easy external authentication with redirect using custom scripts in any language such as Python (Note that OMM v12.2.1.2 external authentication required custom complex integrated java scripts). This includes new support for SSO Authentication with OAuth 2.0. Post GA cumulative patches will include support for the Security Assertion Markup Language (SAML) standard, and native cloud authentications such as Amazon AWS and Microsoft Azure.

- GENERAL:
  - All Java code is now compiled with OpenJDK.
  - All Third Party & Open Source Software has been upgraded to the latest versions for better security vulnerability protection.

- UPGRADE REQUIREMENTS:

- CPU & MEMORY:
  The OMM v12.2.1.3 now uses Lucene as the search engine instead of using the text search capabilities. Consequently, the overall hardware requirements now demand as much processing resources (CPU and memory) on the OMM Application Server machine as on the underlying Database Server machine. (OMM v12.2.1.2 use to demand more resources on the database server as all searches were preformed using the database server).

- UPGRADE PROCESS:

  - OMM v12.2.1.2 SOFTWARE UPGRADE & DATABASE MAINTENANCE:
    You must download and apply the latest OMM v12.2.1.2 Cumulative patch (July 2018 or newer), and make sure the OMM v12.2.1.2 software still works properly after that step.
    You must then make sure that the regularly scheduled database scheduled has ran successfully and long enough to have no further actives to do (such as purging deleted content from the database)

  - OMM v12.2.1.2 DATABASE BACKUP:
    You must then perform a full database backup (OMM, data, indexes and scripts), restore it on a brand new (different) database server, and make sure the OMM v12.2.1.2 server software still works properly after that step.
    (Do not rely on the OMM backup script for that process, you must use real full database backup).

  - OMM v12.2.1.3 SOFTWARE INSTALL & DATABASE UPGRADE:
    Install the OMM v12.2.1.3 software on a new directory (independently of the OMM v12.2.1.2 install directory). Use the Setup utility to point to the database to upgrade. Starting the new OMM v12.2.1.3 server will automatically perform an upgrade of the database's OMM data and scripts. Note that OMM v12.2.1.3 uses Lucene on the OMM server for search, therefore the database will no longer need to use text search indexes and will therefore need less space in the database

- POST UPGRADE:

  - FLAT FILES:
    OMM v12.2.1.2 had no proper support for flat files which are now fully supported as part of the new data cataloging capabilities of OMM v12.2.1.3. Therefore, the early Flat File (CSV or XLSX) prototypes beta bridges have been discontinued and replaced by the import bridge from File System (CSV, Excel, XML, JSON, Avro, Parquet, ORC), or the other new file system / object store import bridges such Amazon S3, Azure Blob Storage, Hadoop HDFS, etc. which can all contain flat files. All these file system import bridges now create multi-model content which can be stitched to data mappings and other DI/ETL models. Any content imported from Flat File (CSV or XLSX) prototypes beta bridges can still be visible in OMM v12.2.1.3, but no further imports can be performed, and migration to the new bridges cannot be automatized (different parameters and different content type from single to multi model). Therefore, new models should be created with the new file system bridges, and the old content (from the prototype beta bridges) should be deleted.

  - PHYSICAL DATA MODELS (PDM):
    In OMM v12.2.1.2, PDM were used to document (including data model diagrams) existing databases, as well as designing new databases (new tables, columns, etc.). In OMM v12.2.1.3, PDM is no longer needed to document existing databases (including data model diagrams, glossary integration, etc.). Consequently, OMM servers can no longer create new PDM models, although any existing PDM created with OMM v12.2.1.2 are still operational on OMM v12.2.1.3. The bottom line is that the OMM v12.2.1.3 new way to document data stores / databases is not only as powerful as PDM but it is much more efficient with version management (changes after new harvesting). Consequently, we recommend all PDM models used to document databases to be converted to models which can be performed without any loss of documentation, by means of a conversion script available on PDM models.

OMM 12.2.1.2.0 based on MIMM OEM 9.1.0 (06/30/2017)

- HARVESTED MODEL CHANGE DETECTION avoids systematically creating a new version of the content upon scheduled harvesting of large database, data modeling, data integration, or business intelligence servers. This is automatically performed as side effect of any new harvesting by a systematic and efficient (fast) model comparison with the previously harvested metadata This dramatically reduces the needed database space by creating fewer versions, and enable the possibility of reliable notification only if a change really occurred. Note that in previous versions, the incremental harvesting already offered systematic and automatic reuse of unchanged models (e.g. BI Reports) from a large a multi-model server (e.g. BI server)

- SUBSCRIPTION / NOTIFICATION mechanism on select changes at both the repository model level (e.g. a new version of a data store is harvested) and at the model object level (e.g. a terms changed or ready to approve/review in a Business Glossary under Workflow). Anyone may be assigned stewardship roles and thus will be notified as new imported content is harvested, with links back to the new object and the ability to compare using the newly re-written powerful comparator, and the ability to identify impacts of change for any architecture or configuration of assets.

- CUSTOM ATTRIBUTES on any harvested metadata (models) from data stores, data modeling, data integration, and business intelligence tools. Therefore allowing to tag any metadata (from Hive tables to BI reports down at the column/field level) for custom properties such as a company confidential level that can be read for external products on security enforcement and compliance. Note that in previous versions, these same custom attributes could already be applied to authored metadata (models) such as terms of Business Glossaries or tables/columns of Data Models.

- BUSINESS GLOSSARY WORKFLOW for the business users behind the Metadata Explorer UI. Note that in previous versions, a (customizable) Workflow was already available in the Metadata Manager.

- DATA INTEGRATION BROWSING AND LINEAGE for the business users behind the Metadata Explorer UI, allowing them to browse the data integration jobs (from DI/ETL/ELT tools as well as SQL Scripts) and analyze the summary data flow lineage of their execution. Note that in previous versions, the browsing (open) and full detailed data flow lineage of any data integration models (DI/ETL/ELT and SQL scripts jobs) were already available in the Metadata Manager (and still are).

- DATA CONNECTION STITCHING MAJOR IMPROVEMENTS now offering to stitch by column position (needed in SQL insert statements of ETL scripts), and smart case aware stitching (as some database's name spaces like schema/table/column are case sensitive while others are not)

- BULK DATA MAPPING at the table level.

- MODEL COMPARE/MERGE: The comparison facility has been completely re-written to include comparison for every level of detail for those models with the same profile (e.g., data model from one technology and data model from another). Even entirely different contents (e.g., an ETL and a data model, or a BI Design and Glossary) may be compared, only at a lessor level of granularity (basically at the granularity of stitching, e.g., schema, table, column). Finally, for physical data models (including documentable models based upon harvested database structures) one may use a powerful merge feature again with full control down to any level of granularity.

- DATA MODELING Major improvements and new features involving the physical data modeling capabilities centered around a data documentation tool enabled through physical data modeling based upon the structure harvested from existing data stores of the of data warehouse and data lake (including traditional

RDBMS and Hadoop Hive big data) Also includes new advanced support for physical data model diagram editing, relationships definition, all the way to export to data modeling tools, business intelligence design, etc., and comparison/compliance with live database / big data hive implementations..

- REST API SDK major enhancements with many new features

- LIGHTWEIGHT MODELS: Model content (such as a harvested databases or data models) can be stored in the repository as a lightweight model (just the XML file), or fully expanded (as both XML file and fine grained repository objects). When retaining many historical versions of a model, using lightweight models saves repository space, and also avoids slowing down the search by not indexing historical repository objects. Lightweight models cannot be directly used in a Configuration or in a Mapping. However, the lightweight model of a data store (such as a RDBMS or Hadoop Hive) can be documented with a Physical Data Model (PDM) for data model diagramming and semantic linking to a Business Glossary (BG). Such a PDM can of course be used in any Mapping or Configuration to be exposed to business users in the Metadata Explorer. Note that lightweight models can immediately (without any loss of performance) be opened in the Metadata Manager (to browse metadata or trace lineage within that model), Compared (with the Model Comparator to analyze the difference between versions), Exported (for example to BI design tool).

- UPGRADE NOTES: The Business Glossary Workflow has been significantly improved in the metadata explorer. Therefore, before upgrading to this version, it is strongly recommended that all business glossaries under workflow have published terms only (this can be achieved by listing all draft terms and either publishing or reverting them to the previously published state). Otherwise, the upgrade process will systematically publish all draft terms in their current state (which can be undesirable if the current state is not what you would like to publish). Finally, after the upgrade, you will need to manually re-enable the Workflow on these Business Glossaries.

OMM 12.2.1.1 based on MIMM OEM 9.0.2 (06/10/2016)

- METADATA MANAGER:

  - Major improvements in MODEL VERSION / CHANGE MANAGEMENT preventing the creation of unnecessary new versions of models if the source metadata (e.g. a database, or data model) has not changed since the last automatically scheduled metadata harvesting. This is new feature is achieved by taking advantage of the MIMB's new capabilities to compare the metadata of a newly imported model with a previously imported one in order to detect any change. The major benefit of this new feature is to dramatically reduce the disk space in the repository by automatically deleting unnecessary versions.

  - New CONFIGURATION / VERSION CHANGE MANAGEMENT capabilities offering a comparator of versions of configurations.

- METADATA EXPLORER:

  - Major redesign of the Metadata Explorer UI on both the look & feel and actual capabilities.

  - New METADATA SEARCH/BROWSE with FILTERING AND REPORTING capabilities offering:

    - New Search (or Browse) with Filtering capabilities on any attributes/properties

    - New choice of result display as a classic Google like "LIST", or a new powerful "GRID" offering a spreadsheet like display of multiple attributes/properties at once. Such attributes/properties can be individually selected, reordered, and sorted, basically offering a full metadata reporting solution. The results can of course be downloaded as CSV/Excel files.

  - New METADATA EDITING Capabilities at many levels including:

    - Numerous new fast and easy "in place" editing to Rename objects, Edit Descriptions, and more.

    - The new Search/Browse GRID display also offers efficient editing with:

      - TABULAR EDITING of multiple objects at once such as Business Glossary Terms, Data Models Tables, or Table Columns

      - BULK CHANGE of multiple objects at once, where a search can return multiple objects (that can then be selectively subsetted) for which changes can be performed at once (e.g. Change the Security Threat Level to Orange to a set of tables at once)

- METADATA AUTHORING TOOLS:

  - Common Features:

    - Major improvements in CUSTOM ATTRIBUTES (also known as User Defined Properties) to objects of the Business Glossaries and Data Models

      - Custom Attributes are now common to the OMM repository (e.g. Security Threat Level = [Red, Orange, Yellow, Blue, Green] and are therefore shared between Business Glossaries, Physical Data Models, etc. Therefore, having a centralized place for maintenance (e.g. adding a new value: purple)

      - Custom Attributes can now have a default value (e.g. default value is green)

      - Custom Attributes now have a much wider scope to be applied at any level from a high level repository object (e.g. harvested Model, Data Mapping, Directory) to fine grain model objects (e.g. A Business Glossary / Term, and/or a Physical Data Model / Column)

      - Custom Attributes now have a security group associated to them (e.g. the Security Threat Level custom attribute may only be set by a custom Security Approved group)

    - New AUDIT TRAIL for any changes in objects of Business Glossaries and Data Models, including who changed a given attribute and when

  - BUSINESS GLOSSARY:

    - New Business Glossary editing capabilities are now available to the business users under the Metadata Explorer UI. (includes tablet friendly in place editing, as well as HTML formatting of descriptions, etc.)

  - DATA MODELING:

    - PHYSICAL DATA MODEL (data documenter for existing data stores databases, data warehouse, data lake):

      - NEW feature with this version of OMM

  - DATA MAPPING:

    - DATA MAPPING SPECIFICATIONS (Data Flow Mapper)

- - Minor improvements and bug fixes
- ARCHITECTURE & TECHNOLOGY:
  - Major database performance improvements
  - Updated OMM Web Services which are now based on RESTful API technology (i.e. therefore removing any security vulnerabilities of the older Axis technology)

OMM 12.2.1.0 based on MIMM OEM 9.0.1 (12/15/2015)

- ARCHITECTURE & TECHNOLOGY:
  - 100% Java delivery and installation allowing support for Windows as well as a variation Linux/Unix deployments
    - The Metadata Management Server (OMM) can now be installed on Unix/Linux variations.
    - The Metadata Harvesting Agent (MIMB bridges) can be installed:
      - Locally (co-located with a OMM server on Linux) to run 100% java based bridges including JDBC database bridges (Oracle, Teradata, DB2, SQL Server, etc.), big data bridges (Hadoop Hive, HCatalog), and other popular bridges such as CA ERwin xml, Informatica PowerCenter xml, Tableau BI, etc.
      - Remotely on a Windows machine for C++ based bridges and COM API based bridges requiring software SDK running on Windows such as CA ERwin native (.erwin) files, and many BI tools like SAP BO Universe, Microstrategy, QlikView, etc.
  - 100% HTML 5 (no more Flash) and tablet friendly look & feel, allowing to run on Mac, Tablets, and more
  - Metadata Explorer Customization to offer a better experience to targeted business users of the customer company:
    - Customize headers, company logos, menus, search categories, home page (with search widgets), automatic opening of reports (BI portal experience, BI report documentation (adding BG terms)
  - Improved Metadata Explorer Search Performance
  - Improved Data Integration (DI/ETL/ELT Import Bridge) Harvesting Performance
    - Now offering detailed DI data flow lineage analysis on demand only (in real time), instead of pre-calculating even if unused

OMM 12.1.3.0.2 based on MIMM OEM 8.0.3 (05/19/2015)

- DATA MODEL DIAGRAM VISUALIZER:
  - Major improvements with the HTML5 redesign including better scalability, performance and overall layout quality
  - New interactive search
  - New diagram auto layout
  - New dynamic layout of a diagram subset starting from an entity with all related entities with one or two levels of relationships (very useful for large diagrams)
- SEMANTIC MAPPER:
  - New support for BI Report metadata (such as a page of a workbook, a table or pie chart on page, or just the axis of a graph), allowing to document precise items within a given report by associating (semantic links) business glossary terms to them.
  - New support for models within a multi-model server source, allowing to provide documentation (or glossary) at the high level of a given data model (or BI report) within a multi model server, such as:
    - a Data Modeling (DM) repository server with many data models inside (e.g. CA ERwin Mart)
    - a Business Intelligence (BI) content server with many BI designs and BI reports inside (e.g. SAP BusinessObjects)
- BUSINESS GLOSSARY:
  - New customizable role driven workflow support (can be turned off) and security enforcement
- METADATA EXPLORER UI:
  - New integrated presentation of Business Glossary terms related to any data store or BI report objects, including the ability to add/remove BG terms documenting a data store or BI report
  - Improved search support for auto complete and objects
- ADMINISTRATION:
  - New group based security model (as side effect of the new role based Business Glossary workflow)
- ARCHITECTURE & TECHNOLOGY:
  - New support for HTML5 only devices like iPad and other tablets (Flash will no longer be needed)
    for graphically tracing any data flow or semantic lineage (Lineage Analyzer),
    and for visualizing data models (Diagram Visualizer).
  - Java 8 (compiled with backward compatibility with Java 7) compliance (Java 6 is no longer supported)

OMM 12.1.3.0.1 based on MIMM OEM 8.0.1 (12/02/2014)

- FEATURES:
  - New "Show Related Reports" (e.g. from a Glossary Term)
- METADATA MANAGER UI:
  - New Metadata Manager look & feel (to match the Metadata Explorer)
  - New Business Glossary batch editing
- METADATA EXPLORER UI:
  - New customizable action menus per repository object type (e.g. open BI report with BI tool by default)
  - New dedicated web pages for tracing data lineage & impact, and semantic definition & usage
  - New access to the Configuration's Enterprise Architecture Diagram

OMM 12.1.3.0.0 based on MIMM OEM 8.0.0 (10/01/2014)

- Initial Release

4. System requirements

4.1 Important preliminary disclaimer notice on all requirements

The following requirements only define the minimal requirements to run the application server with reasonable performance based on the provided tutorial, or small business use cases. The actual requirements for enterprise wide use cases based on larger models and configurations do require significantly greater resources to obtain acceptable performance.

The following requirements are based on:

- minimal to no network overhead (assuming both the database and Application servers to be locally installed),
- vendor's default install of the current version of their software (with all current service or fix packs),
- no other applications sharing such hardware (starting from a clean machine),

Any other hardware/software configurations are acceptable as long as they provide the same (or better) results on the provided performance benchmark. In such case, if any problem is discovered (e.g. scalability or performance issues), then the customer must be able to reproduce the issue using an environment that conforms to the minimum performance requirements as defined herein.

Potential known issues include (but are not limited to) the following:

- actual usable hardware performance on virtual environments (e.g VMWare configuration and licenses)
- network overhead on remote servers (e.g. bandwidth, proxy, VPN issues, VMWare inter OS network limitations without a proper license, etc.)
- shared resources with competing applications on the same OS, or between OS on a virtual environment,
- licensing limitations (e.g. most database server licenses limit the number of usable core/CPU)
- vendor software known limitations and requirements (e.g. Oracle on VMWare vs Oracle VM)

4.2 Web Client requirements

Users only need an internet browser:

- Google Chrome v67 or newer
- Microsoft Internet Explorer (IE) v11 or newer, and make sure it is NOT working in IE 10 compatibility mode (Settings > Compatibility View Settings: no checked boxes).
- Microsoft Edge v41 or newer
- Mozilla Firefox v61 or newer
- Apple Safari 11.1 or newer

4.3 Application Server Requirements

Hardware Minimum Requirements (based on physical hardware performance, not a virtual environment):

- 2 GHZ or higher quad core processor (4 cores)
- 8 GB RAM
- 10 GB of disk space (all storage is primarily in the database server, although the search index and metadata cache is on disk)

However, the Hardware Recommended Requirements for a full enterprise application server suggests at least 64 cores and 300 GB of memory, as can be calculated below:

Apache Tomcat Application Server Configuration

Active Concurrent Users see (1)	Memory (GB) see (4)	CPU (cores)	Database Conection see (5)

		Per User	Total	Per User	Total	Per User	Total
Light Users see (2)	**200**	0.1	20	0.1	20	0.2	40
Heavy Users see (3)	**100**	2	200	0.25	25	1	100
Server Database caching			10				
Server Search index caching			10				
Extra safety buffer		25%	55	25%	11.25	25%	35
			295		56.25		175

(1) Active Concurrent Users during peak daytime (among thousands of potential users on SSO / LDAP), and assuming all metadata harvesting and indexing is scheduled over night

(2) Light users are typical business / end users performing search, browse, report, review, comment

(3) Heavy users are typical advanced developers performing editing, mapping and complex lineage.

(4) Memory (GB) as configured in /tomcat/conf/tomcat.properties with the Setup.bat or .sh utility

(5) Database connections as configured in /tomcat/conf/MetaIntegration/localhost\MM.xml

Operating System Requirements:

- Microsoft supported Windows 64 bit versions (including Windows 2008 Server, Windows 2012 Server, Windows 2016 Server, Windows 2019 Server, Windows 7, Windows 8.x, and Windows 10).

    - Ensure that installer is executed with full Administrator privilege

    - Ensure that Microsoft .NET Framework 3.5 or higher is installed

    - Ensure that all current Microsoft Windows critical updates have been applied

- Most popular Linux/Unix 64 bit Operation System Versions (such as Redhat).

    - About Java Dependency:
      This software is not based on code compiled for any particular Operation System OS (e.g any particular Linux distribution or version), therefore, the supported OS are 100% based on the supported OS of the underlying Java Runtime Environment (JRE) and Tomcat software (see their supported platforms for further details).

    - About Headless Linux:
      Recent versions Java Runtime Environment (JRE) such as 11 no longer bundle any fonts, and therefore rely on the underlying operating system fonts. Most bare Linux configurations bundle a minimum set of fonts, including all bare Linux VM offered on most cloud companies. However, when using an extremely bare minimum true headless Linux configuration, fontconfig and libfontconfig1 must be installed and configured on the system. Otherwise the JRE cannot access the fonts needed in order to perform diagram rendering.

Application Server Engine Requirements:

- Apache Tomcat 9 - 64 bit (bundled)

- Other Application Servers (such as IBM WebSphere or Oracle WebLogic) require manual install/setup, and are therefore not supported by this version.

Java Runtime Environment (JRE):

- OpenJDK 11 - 64 bit (bundled and recommended)

- Other Java Runtime Environment (JRE) (such as IBM Java) require manual install/setup, and are therefore not supported by this version.
  Note that Java bridges are compiled backward compatible to JRE 8

4.4 Database Server Requirements

Hardware Minimum Requirements (based on physical hardware performance, not a virtual environment):

- 2 GHZ or higher quad core processor

- 8 GB RAM

- 20 GB of disk space (or more as needed for the data)

The OMM Database Server can reuse your existing Oracle database server:

- **Oracle 12c, 18c and 19c - 64 bit** (recommended for large enterprise, default supported version)

    - The character set of the database must be AL32UTF8 (UTF8).

    - In order to find out what exact Oracle edition/version is actually installed:
      ```
      sqlplus.exe SYS@<DB-NAME> as SYSDBA
          select banner from v$version where BANNER like '%Edition%';
      ```

    - In order to find out how much memory is actually available to the Oracle database, it is important to first understand how Oracle's memory is configuration and used:

        - The actual available System Global Area (SGA) memory can be found using:
          ```
          sqlplus.exe SYS@<DB-NAME> as SYSDBA
              show sga;
          ```

```
        select * from v$sga;
        select * from v$sgainfo;
```
- The actual available [Program Global Area (PGA)](#) memory can be found using:
```
    sqlplus.exe SYS@<DB-NAME> as SYSDBA
        select * from v$pgastat;
```
- In order to find out how much processing CPU/Cores is actually available to the Oracle database, query the table [v$parameter](#) for the value of [cpu_count](#), or query the table [v$license](#) as follows:
```
    sqlplus.exe SYS@<DB-NAME> as SYSDBA
        select * from v$license;
```

Database Administrator privileges are required to install/setup/uninstall the database.

In general, one must ALWAYS install the latest service packs for a given database version BEFORE creating the OMM database. E.g., for Oracle 11.2 one is required to apply the patches to upgrade to 11.2.0.3, or whatever is the latest patch level at the time. In addition, Oracle 11.2.0.4 must have patch 17501296 applied.

Virtual Memory: For a Windows based database server, be sure to either:

- set the page file size to be managed automatically by OS

- or it should be at least 3 times the memory or RAM size for the machine.

Thus, you must have more than that much free disk space (at least 3 time the amount of memory or RAM) on the drive where the page file is defined to reside.

5. Database Server Setup

The OMM Application Server requires the connection to an existing Database server for metadata storage (metadata repository)

The following database setup scripts and instructions assume the following by default:
```
    Database Name: MM
    Database User: MM
    Database Password: = MM123!  The database name and user name can be changed, and the password should of course be different.
```

After the product is fully installed and web connectivity has been made, one may connect to a different database by way of the web based user interface at Tools -> Administration -> Database.

5.1 Database on Oracle

Create a user MM and a database MM with the following privileges:
```
sqlplus.exe SYS@<DB-NAME> as SYSDBA

    -- Delete previous user and database if needed
    -- DROP USER MM CASCADE;

    CREATE USER MM IDENTIFIED BY MM123!;

    GRANT CONNECT TO MM;

    GRANT CREATE TABLE TO MM;
    GRANT CREATE VIEW TO MM;
    GRANT CREATE SEQUENCE TO MM;
    GRANT CREATE TRIGGER TO MM;
    GRANT CREATE PROCEDURE TO MM;
    GRANT CREATE TYPE TO MM;

    GRANT EXECUTE ON DBMS_LOB TO MM;

    -- If you get the error "Database exception occurred: ORA-01950: no privileges on tablespace 'USERS'"
    -- ALTER USER MM QUOTA UNLIMITED ON USERS;
```

6. Application Server Setup

6.1 Application Server Installation and Configuration

The OMM Application Server is installed as follows:

- On **Windows** operating systems, use `unzip` to extract the software package (.zip) in the directory of your choice. You should avoid using the "Program Files" directories of Windows 7, 8.x and 10 as they have are now controlled by Windows with special access rights. Depending, on your software installation directory, you may need "Administrator" privileges.

- On **Linux** operating systems, use `tar -xjvf` to extract the software package (.tbz2) in the directory of your choice. Depending, on your software installation directory, you may need "root" privileges.

If your are using an existing database and do not wish to customize the application server (e.g. memory allocation, Windows services), then you can skip this step and go directly to the section on [Application Server Execution and Initialization](#)

Otherwise, go to the software home directory and "run As Administrator" the `setup` utility (.bat on Windows or .sh on Linux). This setup utility will allow you to setup the configuration parameters defined below through a user friendly application. After any change on any panel (tab) below, remember to press the **Configure** button in order to perform the configuration changes. A dialog box will be issued to confirm success or failure (with error messages).

Alternatively, this setup utility also works at the Windows command line or Linux shell, use the `-?` the options:

```
[{ -? | --? | /? | --help }] Asking for help
[{ -tp | --tomcat-port }] Tomcat: set the port number
[{ -tm | --tomcat-memory }] Tomcat: set the maximum memory in Mb
[{ -ta | --tomcat-agent }] Tomcat: switch to metadata harvesting only
[{ -ts | --tomcat-service }] Tomcat: install or remove tomcat as a service
[{ -s | --ssl }] SSL: enable or disable ssl
[{ -sc | --ssl-cert-file }] SSL: the X.509 file containing the SSL certificate
[{ -sk | --ssl-key-file }] SSL: the X.509 file containing the SSL key
[{ -sp | --ssl-key-password }] SSL: the password for the SSL key file
[{ -sr | --ssl-root-chain-file }] SSL: the X.509 file containing the SSL certificate chain
[{ -ds | --database-service }] Database: install or remove database as a service
[{ -dp | --database-port }] Database: set the port number
[{ -dc | --database-connection }] Database: set the connection string
[{ -du | --database-user }] Database: set the connection user
[{ -dw | --database-password }] Database: set the connection password
[{ -da | --database-auto-upgrade }] Database: automatically run the upgrades on startup
[{ -mh | --mail-host }] Email: set the mail server host name
[{ -mp | --mail-port }] Email: set the mail server port number
[{ -mu | --mail-user }] Email: set the mail user name
[{ -mw | --mail-password }] Email: set the mail user password
[{ -ms | --mail-sender }] Email: set the mail sender's address
[{ -mx | --mail-external-url }] Email: set the external URL to use in email templates
[{ -ma | --mail-admin }] Email: a comma separated list of emails that will be notified of startup failures
[{ -op | --oracle-product }] Oracle: the edition to switch to: OEMM or OMM4OBI
[{ -ch | --certificate-host }] Certificate: the host name to retrieve the certificate for
[{ -cp | --certificate-port }] Certificate: the port number to connect to
```

- **Product Edition** tab:

    - **Oracle Enterprise Metadata Management (OEMM)**

    - **Oracle Metadata Management for Oracle Business Intelligence (OMM4OBI)**

- **Application Server** tab:

    - **Enable Windows Service**
      This will create the "OMM Application Server" Windows Service, set it for automatic start, and actually start it. Unchecking that box will delete the "OMM Application Server" Windows Service, which is a good idea before uninstalling the OMM software.

    - **Metadata Harvesting Server Only**
      This allows to setup this application server as a metadata harvesting server only, rather than a full metadata management server. This is very useful in architecture deployments where the metadata management server is:

        - deployed remotely on the cloud but needs to access metadata harvesting servers (agents) locally on premise, or

        - deployed on Linux but needs to access metadata harvesting servers (agents) on a Windows machine where DM/DI/BI client tools are Windows only (e.g. COM based SDK).

    - **Metadata Harvesting Browse Path**
      This controls the access to the file system for metadata harvesting. The default value is set to '*' which means any Windows drive (C: and any mounted remote drive R:) or any directory from root on Linux. It is strongly recommended to limit the access to a common shared data location, and avoid system area.

    - **Data Directory**
      This is the location of all data files, including log files as well as the metadata harvesting caching. The data directory is located by default in the 'data' subdirectory of the application server home directory. It is recommended to separate the program data from the program files, this allows you to provide a new location for the data in a separate area (with regular backups if possible). Note that changing to a new location will not move the existing data from the previous location. Either the new location already had the data (from a previous install), or new data will be created.

    - **Max Memory**
      This defines the maximum memory used by Java (JRE) on the OMM Application Server (Apache Tomcat). This is unrelated to the maximum memory used by java on bridges for Metadata Harvesting which is separately set by default with the M_JAVA_OPTIONS variable in %OMM_HOME%\conf\conf.properties, and can be overridden within the Miscellaneous parameter of memory intensive import bridges (e.g. JDBC).

    - **Port Number**
      This sets a custom start port number by default to avoid conflicts with other web application servers. Note that the OMM Application Server uses 2 consecutive ports. However, this can be set back to 80 to avoid having to specify any port number in the URL.

    - **SSL**
      This enables Secure Socket Layer (SSL) communication for web access (HTTPS). In order to support HTTPS, the OMM Tomcat service must be configured to work with HTTPS for encryption of passwords and other content exchanged between the web client and the OMM Application Server. In this case, you will need a certificate for the HTTPS protocol to work. Note: the OMM software does not perform any error handling for validating a certificate associated with the OMM Application Server, and most web browsers will report an error if the certificate is not provided by a valid certificate authority. Thus, your certificate should be a trusted certificate provided to you by a valid Certificate Authority.

        - **Certificate file**
          Mandatory - Can be a .pem (privacy enhanced electronic mail), .pfx (Windows personal information exchange) or a .jks (Java keystore)

        - **Root Certificate file**
          Optional (only required if the above certificate file was generated by an external company as a certificate authority)

- **Key file**
  Optional (often it is the case that the certificate file also contains the key)
- **SSL Key Password**
  Optional (required if the key is password protected)

6.2 Application Server Upgrade

6.2.1 Understanding the Data Locations

Most application data is obviously located inside your database server, you are responsible for regular backup of such database. Upgrading your application may also upgrade the associated database content (database schema, stored procedures, indexes and of course data). It is important to understand to understand that part of the OMM software is implemented as database stored procedures like tracing the lineage. Therefore a given version of OMM corresponds to a version of the MM software in the application server (tomcat) and a version of the MM software in the database (e.g. tomcat) Therefore make sure you always backup your database before any upgrade.

Furthermore, the upgrade process may take several hours (on large repositories) and also need extra space for temp data during the migration. Therefore make sure the database has at least 20% free space.

Finally, it is also important to understand that the software installation directory (known as `%OMM_HOME%` in this document) also contains some critical application data and application setup customizations that have to be taken into account in your backup or upgrade process, including:

- `%OMM_HOME%\data`
  which contains other application data, including:
  - `MIMB\` contains the metadata harvesting cache (critical for incremental harvesting, and metadata export)
  - `search\` contains the lucene search engine indexes (they will be automatically fully rebuilt from scratch if the folder is empty which will take a lot of time)
  - `data quality\` contains the data profiling information
  - `logs\` for the log files `tomcat` and `mimb`
  - `tmp\` for any temporarily files (including from the mimb bridges)
  - `files\` for MM multi-process protected temporarily files used for `mimb` and `mm` (e.g. when comparing models)
  - `webapps\` for application server (tomcat) cache

  Remember that the actual location of this OMM Application Server data directory can be configured with the Setup utility (in the "Application Server" tab).

- `%OMM_HOME%\conf` which contains the OMM configuration / customizations organized as follows:
  - `conf.properties` contains file containing most customizations defined with the Setup utility (in the "Application Server" tab)
  - `ModelBridgeList.xml\` contains the list of enabled bridges and their names
  - `resources\` directory containing any [User Interface Customizations](), in particular `MM.properties` and `MetadataExplorer.xml`.
  - `Template\` contains the default template files of all the above files/directories, including a potentially new updated `ModelBridgeList.xml` or `MetadataExplorer.xml` after cumulative patches.

- `%OMM_HOME%\tomcat\conf`
  with the `tomcat.properties` file containing the tomcat port and memory customizations defined the Setup utility in the "Application Server" tab, and the `keystore` file containing the tomcat SSL certificates defined with the Setup utility (in the "Application Server" tab).

- `%OMM_HOME%\jre\lib\security`
  which also contains some SSL customizations defined with the Setup utility (in the "Application Server" tab). It is recommended to not reuse such directory, but rather reinstall the SSL keys with the Setup utility.

6.2.2 Upgrade Process

We recommend the following upgrade process:

1. **Stop your OMM application server** in the same way it was started such as stopping the Windows services / Linux daemon, stopping the desktop command windows, or using the tomcat/bin/shutdown.

2. **Backup your OMM data** including your database and data file directories as explained above.

3. **Backup your OMM software** by copying the `%OMM_HOME%` directory as `%OMM_HOME%.old`.

4. **Install the complete OMM new software** (ONLY needed for clean install of a new version) by deleting the old `%OMM_HOME%`, and then creating a new one by unzipping the new OMM full package.

5. **Apply the latest OMM software cumulative patch** by unzipping it from inside the new `%OMM_HOME%` directory.

   - WARNING 1: Make sure you unzip with overwrite on Windows, and use `unzip -u` on linux to update files while retaining permissions.

   - WARNING 2: You cannot use cumulative patches for major version upgrades, you must first start from a clean install of the new major GA version.

   - WARNING 3: You cannot reverse / unzip an older cumulative patch, you must restart from a clean install of the original GA version.

6. **Restore your OMM data and software customization/setup** (ONLY needed for clean install new version) by copying the appropriate files and directories (as previously explained) from `%OMM_HOME%.old` to `%OMM_HOME%`, including at least `\data` and `\conf\conf.properties` but possibly more as used and customized such as `\conf\resources`, or `\tomcat\conf`.

7. **Integrate the OMM new software features in your configuration** by copying potential new versions of files from `%OMM_HOME%\conf\Template` into their matching directories in `%OMM_HOME%\conf\`. For example the new `%OMM_HOME%\conf\ModelBridgeList.xml` may contain some new or updated

bridges. WARNING: if you had customized some files such as `%OMM_HOME%\conf\resources\MM.properties`, you must re-apply/merge such customization starting from the new version of that file copied Template.

8. **Restart your OMM application server** after which your first login as Administrator may prompt you for an upgrade of your MM database.

9. **Redo all above steps for any other MIMM Application server configured as MIMB harvesting agent.**

10. **Update your OMM repository content** (ONLY as needed) if the upgrade contains new and improved import bridges that would require to fully re-import the model (remove incremental harvesting in such case) and this will therefore require to re-build the related Configurations.

6.2.3 Version Specific Upgrade Issues and Recommendations

Upgrading to a new version may have version specific issues or recommendations that are listed at the bottom of the release notes: see <u>Release Changes</u> for more details.

6.2.4 Upgrade and Migration Best Practice

The following critical steps represent the best practice in OMM Server upgrade or migration to a new machine (on prem or cloud)

Backup

As with any migration / upgrade process, it is critical to backup the underlying data:

1. the installation data and conf directories (see <u>Understanding the Data Locations</u>)

2. the repository database. (see <u>Database Server Backup/Restore</u>)

Repository Cleanup

One of the most critical first step is to save disk space and speed up performance by performing a major cleanup of the repository:

1. Apply the latest MIMM and MIMB Cumulative patches (in the OMM Server and all MIMB Harvesting Agents).

2. Make sure that all Configurations are NOT on auto update.

3. Stop any scheduled operations, including all automatic metadata harvesting and database maintenance (Manage > Schedules).

4. Delete all unused / test Directories, Configurations, Models, Mappings, etc. (Manage > Repository).

5. Delete as many versions as possible (e.g. retaining the last few versions) of the remaining critical Configurations (Manage > Repository).

6. Delete unused model versions (Manage > Repository: Repository object > Operations > Delete unused versions).

7. Run the database maintenance to purge all deleted objects from the database (MANAGE > Schedules: Run Database Maintenance). Note that each database maintenance run purges deleted models for only 2 hours, therefore the database maintenance has to run as many times as needed until the log no long shows any models to delete.

Model Imports

In order to avoid surprises after the upgrade/migration, it is critical to make sure that you started with a stable environment. The most important aspect of that is to make sure all imports are working before any upgrade because the source may no longer be available, may not have been imported with the latest version of the bridge, or may simply not have been imported for a long time.

1. Apply the latest MIMM and MIMB Cumulative patches (in the OMM Server and all MIMB Harvesting Agents).

2. Make sure that all Configurations are NOT on auto update.

3. Stop any scheduled operations, including all automatic metadata harvesting and database maintenance (Manage > Schedules).

4. Delete the model import cache (data\MIMB\cache*).

5. Manual full import (no incremental harvesting) of all Models (one by one) with clear import cache and uncheck "Create new versions only when new import has changes".

6. Manual force build of all Configurations (one by one) with testing (connection stitching as needed for lineage).

Repository Database

If the OMM repository database server has to be migrated to a new machine (e.g. from on prem to cloud), make sure you follow the proper the proper database vendor process (see <u>Database Server Backup/Restore</u>).

Harvesting Agents

If the OMM Application Server has to be migrated to a new machine (e.g. from on prem to cloud), Make sure to reconnect each MIMB harvesting agents to the new OMM Application Server.

Note that such MIMB harvesting agents can remain on prem, while connecting to the new OMM Application Server on cloud.

6.3 Application Server Execution and Initialization

The easiest way to start the OMM Application Server is to go to the software home directory and use the `RestartApplicationServer` utility (.bat on Windows or .sh on Linux).

- On **Windows** operating systems, you can alternatively use the Windows Services to control the OMM Application Server by using the `RestartApplicationService.bat` utility instead. This utility will create the Windows Service for the OMM Application Server, if it was not already created by previous execution of this utility or the `Setup.bat` utility. At this point, you can simply use the Windows Services to start, stop or restart the OMM Application Server automatically.
  When running the OMM Application Server as a Windows Service, it is important to configure the user running such service in order to have full access rights to the needed files and applications. For example, the MIMB bridges involved in the metadata harvesting may need to invoke the SDK of third party software such as the COM based API of CA ERwin, or SAP BusinessObjects Universe Designer.

In order to set such access rights, go to the services manager of Windows, right-click on the OMM Application Server service. Then, go to the "Log On" tab to define an account by name under which the service will run.

- On **Linux** operating systems, administrators can use the system daemon directories (e.g. `/etc/init.d/` or `/etc/systemd/`) to control the OMM Application Server (either using the `RestartApplicationServer.sh` utility or directly controlling the tomcat server in the home directory).

The final initialization steps of the setup are performed over the web browser as follows:

1. **Connection**
   Connecting to the server on Windows can be simply achieved by opening the `Metadata Management` link in the home directory. In all cases, you can connect to the server using your internet browser to open by default: http://localhost:11580/MM. Note that the default port of this URL number may have been changed by the `Setup` utility in the section Server Installation and Configuration..

2. **Database**
   Define the connection to the previously created database (in the above steps), by providing the database type, user, password, and URL (JDBC connection). Press `Test Connection` button to verify proper database connectivity. Finally, when the pressing the `Save` button, the OMM Application Server will create all the necessary tables in the database.

3. **Login**
   Login as "Administrator" with password "Administrator". Note that you should change that password later in the application by going to: `Tools -> Administration -> Users`)

6.4 Custom integration with authentication environments

OMM is able to support three authentication methods:

1. Native Authentication, where the password is managed by the software and stored within the database.

2. LDAP Authentication, where the software does not manage or store the LDAP passwords at all. Instead, it is simply passed it through to LDAP in order to authenticate.

3. External Authentication such as Single Sign On (SSO), where the software does not perform any authentication, and leaves that responsibility to a local single sign on service managed by the customer.

In Tools->Administration->Users one may specify either:

1. Mixed Native and LDAP authentication where users may be authenticated either as native users or LDAP users

2. External authentication where the system does not perform any authentication, leaving it up to a local Single Sign On environment.

6.4.1 Native Authentication Configuration Issues

There are no specific configuration steps for Native Authentication.

6.4.2 LDAP Authentication Configuration Issues

There are no special server configuration issues for LDAP Authentication. LDAP connectivity configuration is documented in the online help.

6.4.3 Windows Authentication Issues

It is also possible to enable the Application Server to obtains authentication for users from Windows authentication via the browser (client). This way, users will automatically be authenticated if they are running from a Windows session.

To do so, one must install a third party product named Waffle (Windows Authentication Functional Framework) as an addon (see here):

1. Please ensure that all LDAP settings are correct and users are able to log into the product via LDAP authentication. LDAP connectivity configuration is documented in the online help.

2. Unzip the Waffle zip.

3. Copy all the jar files from it to `%OMM_HOME%\tomcat\lib`

4. Open `%OMM_HOME%\tomcat\conf\web.xml`. Search for "Windows authentication support". Uncomment the block following that.

5. Restart OMM.

6. You should have windows authentication enabled now. Any valid windows user will be logged in as guest by default as long as licensing allows it. If you need to get an administrator interface, you can access: http://host:port/MM/Auth?nativeLogin (optionally you can force a redirect to either &redirectTo=/MM/Explorer or /MM/Manager)

7. Provide connection information for the database you created above.

Note: Waffle is designed around Windows libraries and thus it is recommended that you use a Windows OS based machine as the Application Server. While it is possible to use Waffle on a Linux based machine, it will require a great deal of manual setup and compilation. Please follow the Waffle documentation for such an implementation (see here).

Note: When using Waffle on a Windows based Application Server (as is recommended) you must run as run the OMM software as a Windows service (not as an Application) in order for Waffle to work properly.

Note: Automatic Windows authentication will not allow one to use the browser refresh (f5) with IE 8.x when used as the client browser. Refresh will force a re-authentication on IE 8.x browsers and will not be automatically authenticated. If this occurs, the user must close all instances of the browser and start again. To avoid this issue, one must use IE 9.x or later or another approved browser (see System requirements) In addition, for Internet Explorer and Firefox, you must configure the browser at each client to support automatic Windows authentication. Please refer to the Waffle web site here.

6.5 Custom integration for Secure Socket Layer (SSL) communication

Important Disclaimer: SSL is primarily used for HTTPS secure communications from the web browser clients to the OMM Server itself. Such common HTTPS setup can be fully achieved with the `Setup` utility as explained in Server Installation and Configuration. The following steps are provided for illustration purpose only (manual steps), describing what the `Setup` utility already performs automatically. THEREFORE, YOU DO NOT HAVE TO PERFORM THESE STEPS BELOW.

If you want to manually install a your own certificate, you must:

1. Change the referenced (in server.xml) connector entry parameters (keystoreFile and keystorePass) to point to the correct keystore file and password.

2. Import that certificate into the JRE that is being used by this tomcat. The default JRE is located under:
   `%OMM_HOME%/jre.`

3. Use the following commands:
   ```
   cd %OMM_HOME%/jre/lib/security
   move jssecacerts jssecacerts.old
   %OMM_HOME%/jre/bin/keytool -importkeystore -srckeystore {your_keystore} -keystore jssecacerts
   %OMM_HOME%/RestartServerService.bat or RestartServerApplication.bat
   ```

After the configuration, use the default URL to Access OMM: https://localhost:11580/MM

Or use the ports specified in the server.xml file. For example:
```
<Connector port="11580" maxThreads="200"
           scheme="https" secure="true" SSLEnabled="true"
           keystoreFile="conf\keystore" keystorePass="changeit"
           clientAuth="false" sslProtocol="TLS" />
```

6.5.1 Configuring OMM to securely connect via HTTPS to another OMM server for Metadata Harvesting

The OMM Server can import metadata from another OMM Server configured as a metadata harvesting only MIMB Agent. The two typical use cases are:

- "Local Network" where the the OMM Server is on Linux and needs to import metadata from a MIMB Agent on Windows (for Windows only bridges like Erwin DM, or SAP BusinessObjects)
  In such case, the OMM Server is pulling metadata from its registered MIMB Agent, by making requests when needed.

- "Over the Web" where the OMM Server is on the cloud and needs to import metadata from another Server on prem.
  In such case, the MIMB Agent is pushing metadata to its registered OMM Server, by requesting for any import jobs on regular basis.
  Therefore in this configuration, if the OMM Server is access via HTTPS with SSL, then the MIMB Agent must be configured to access that OMM server by running the following command on the MIMB Agent:
  `setup.sh -ch MyServer.Mydomain.com -cp 443`

Important Disclaimer: the following steps are needed ONLY IF you use a self signed certificate for SSL (WHICH IS NOT RECOMENDED), AND ONLY in the case of configuring OMM to securely connect via HTTPS to another OMM server for Metadata Harvesting. Only in such exceptional use case, then the following additional steps have to be performed

In order to support HTTPS from a OMM Server acting as the "Metadata Manager" to a OMM Server acting as "Metadata Harvesting" Agent, the Administrator needs to import the trusted certificate that the OMM "Harvesting Agent" Server is using into the JRE that the OMM "Metadata Manager" server is using. The following page describes the process: http://docs.oracle.com/javase/tutorial/security/toolsign/rstep2.html.

The command looks like the following:
```
cd %OMM_HOME%\jre\lib\security
..\..\bin\keytool.exe -importcert -alias john -file YourOwnCertificate.cer -keystore jssecacerts
```

6.5.2 Configuring OMM to securely connect via LDAPS to the Enterprise Directory

In LDAP Authentication, the user password is not managed by the software and is simply passed through to the LDAP system.

Note: this password is not encrypted when communicated between the client and the server. Thus, in order to ensure encryption you may wish to specify HTTPS protocol communication, as above.

Note: this password is also not encrypted when communicated between the server and LDAP. Thus, in order to ensure encryption you may wish to also specify LDAPS protocol communication and thus use SSL to encrypt.

In order to support LDAPS, the OMM Tomcat service does not itself need to be configured to work with LDAPS for encryption of passwords. However, to enable secure SSL communication between OMM and LDAP servers the Administrator needs to import the trusted certificate that the LDAP server is using into the JRE that the OMM Application server is using. The following page describes the process: http://docs.oracle.com/javase/tutorial/security/toolsign/rstep2.html.

The command looks like the following:
```
cd %OMM_HOME%\jre\lib\security
..\..\bin\keytool.exe -importcert -alias john -file YourOwnCertificate.cer -keystore jssecacerts
```

This is an entirely different certificate from the one used by the HTTPS protocol.

6.5.3 SSL Security Vulnerabilities

Poodle is a "Man In The Middle" (MITM) vulnerability which needs to be primarily fixed server side. An attacker can trick the server into downgrading the encryption protocol used to communicate. The servers should be configured to disallow TLS fallback, or to disable SSLv3 as a valid protocol.

If Tomcat has been configured with SSL support, the customer should add the following to the connector description in the %OMM_HOME%\tomcat\conf\server.xml
`sslEnabledProtocols="TLSv1.2,TLSv1.1,TLSv1"`

6.6 Security and Vulnerability Considerations

For extra security and vulnerability reasons, the Apache Tomcat bundled within OMM can be updated as follows:

6.6.1 Tomcat Upgrade To The Current Patches

For security and vulnerability reasons, make sure you apply any current patches from that version of Tomcat:

1. Check the version of Apache Tomcat that was bundled within your OMM (e.g. Tomcat 9.0.10) which is expressed in:
   %OMM_HOME%\Documentation\License\MIMM-ThirdParty-LICENSES.html and
   %OMM_HOME%\tomcat\RELEASE-NOTES

2. Download the latest patch version (e.g. 9.0.10) within the same major version:
   https://tomcat.apache.org/download-90.cgi

3. Unzip in temporary directory

4. Stop Tomcat

5. Copy the lib directory from that temporary directory to the %OMM_HOME%\tomcat\lib (overwriting files if necessary)

6. Restart Tomcat

6.6.2 Tomcat Check For Allowed Referrer

For additional protection, we recommend enabing Tomcat to check for allowed referrer:

1. Edit %OMM_HOME%\tomcat\conf\web.xml

    1. Uncomment the two filter sections in the 'Checks referer is allowed' section. The variable ${server.fqdn} will be substituted with the value of M_SERVER_FQDN in tomcat.properties

    2. Add as many init-param sections as needed to allow reference from other URLs.

2. Edit %OMM_HOME%\tomcat\conf\tomcat.properties by:

    1. Changing the M_SERVER_FQDN variable from 'localhost' to '<myMMServer.myDomain>'

7. Metadata Harvesting Model Bridge (MIMB) Setup

The Metadata Integration or Metadata Harvesting from third party databases, data modeling, data integration or business intelligence tools is performed by the integrated Meta Integration® Model Bridge (MIMB) software. By default, the installer software deploys and configures both OMM and MIMB on the same machine, where the OMM Application Server accesses the MIMB Web Services locally. MIMB can also be installed and configured as a remote MIMB Agent on another machine. This is very useful in architecture deployments where the metadata management server is:

- deployed remotely on the cloud but needs to access metadata harvesting servers (agents) locally on premise, or

- deployed on Linux but needs to access metadata harvesting servers (agents) on a Windows machine where DM/DI/BI client tools are Windows only (e.g. COM based SDK).

Essential customizations (e.g. directories, memory) of the MIMB Application Server can be performed in the following configuration file:
   %OMM_HOME%\conf\conf.properties

Recommended customizations include:

- M_BROWSE_PATH to browse local and mapped network drive.

  All metadata harvesting file and directory parameter references are relative to the server. The reason is that the server must have access to these resources anytime another event (e.g., scheduled harvest) is to occur. When harvesting a model, then, the UI presents a set of paths that may be browsed in order to select these files and directories. Setting the M_BROWSE_PATH parameter allows one to define which drives and network paths will be available in the UI. One may update the M_BROWSE_PATH using the UI (on the application server) presented by the setup.bat (or setup.sh on Linux) command (see also Application Server Execution and Initialization), or by editing the %OMM_HOME%\conf\conf.properties file directly.

  On installation, the set includes all directly attached drives., which is specified by an asterisk "*" (M_BROWSE_PATH=*).

  Note for Windows based application servers: When running as a service, the drive names (mapped) and paths may not be the same as what a user sees when logged in, and thus the "*" value will not be see all drives you might expect when selecting drives using the UI. Instead, one must explicitly list all the drives and network paths that one wants to be available to all users in the UI. Also, it is not sufficient to simply enter the mapped drive id (e.g., "N:\"), as that drive mapping is also generally not available to services. Thus, one should specify the physical drives by letters, but must specify the network paths completely, e.g.,:
  M_BROWSE_PATH=C:\, E:\, \\network-drive\shared\

  Note that the above also applies even to script backup and restore drives.

- M_DATA_DIRECTORY to relocate the data such as the log files, and metadata incremental harvesting cache as needed for very large DI or BI tools.

- M_JAVA_OPTIONS to increase the maximum memory used by java bridges during the metadata harvesting of very large DB, DI or BI tools. Note that this parameter defines the default maximum for all java bridges, however most memory intensive java bridges (e.g JDBC bridges) have the ability to define its own maximum memory in their last parameter called Miscellaneous.

When the MIMB Application Server is used a local metadata harvesting agent connected to a OMM Application Server on the cloud, the additional customizations are needed in the following configuration file:
   %OMM_HOME%\conf\agent.properties

- M_SERVER_URL is the URL of the OMM Application Server on the cloud such as http://server:11580/MM

- M_AGENT_NAME= is the agent name such as MyCompanyOnPemise that the above OMM Application Server will then use to refer to this metadata harvesting server agent

8. User Interface Look & Feel Customization

8.1 Login and Headers

Customize the following files and directories using the embedded instructions (in comments):
   %OMM_HOME%\conf\resources\MM.properties
   %OMM_HOME%\conf\resources\FavIcon.ico (can be .png)
   %OMM_HOME%\conf\resources\LoginLogo.svg (can be .png)
   %OMM_HOME%\conf\resources\HeaderLogo.svg (can be .png) with the following requirements:

```
              - Height must be exactly 27px (required)
              - Ideally single color (recommended)
              - Color should match miti.mimm.header.fontcolor (recommended)
              - Color must be compatible (look nice) with selected miti.mimm.header.bgcolor (recommended)
        %OMM_HOME%\conf\resources\web (optional advanced only)
```

8.2 Metadata Explorer for Business Users

Customize the following files using the embedded instructions (in comments):
```
        %OMM_HOME%\conf\resources\MetadataExplorer.xml
```

9. REST API SDK

The REST API SDK documentation is available within the UI by going to the Help menu (top right corner) under Help on REST API, or go directly to:
http://localhost:11580/MM/REST-API/.

For illustration purpose, a glossary definition search demo is also available at http://localhost:11580/MMGlossaryClient/. This demo assumes a server URL located at "http://localhost:11580", and a glossary in a configuration called "Published". REST API application developers are familiar with the above documentation, and can find the demo source code in Chrome > top right menu > More tools > Developer tools.

10. Database Server Backup/Restore

Oracle 10g, 11g and 1 The OMM Application Server requires the connection to an existing Database server for metadata storage (metadata repository). Metadata Integration recommends to backup the OMM metadata repository regularly and especially before any upgrade.

This document describes the commands and instructions to perform the OMM repository database backup and restore tasks. These database commands and instructions assume the following by default:

- Database Name: MM

- database User: MM

- Database Password: MM123!

The database name and user name can be changed, and the password should of course be different.

We assume that objects from backup are restored into the same database later.

Always use the same database software version to perform the backup and restore. Backups created by more recent version of a database server may not be restored in earlier versions of the database server.

Note that any data that is saved after a backup is done will be lost if you restore the backup.

Stop the OMM Application Server before you perform the backup and restore tasks. Restart the OMM Application Server afterwards.

To ensure the optimal OMM Application Server performance after a restore operation, run the database maintenance script in the OMM Management UI using Tools → Administration → Schedules → Run Database Maintenance to update the database statistics.

Backup and restore on a very large OMM repository database may take a long time. Refer to the database backup and restore documentation to enable parallelism, incremental backup and restore for better performance. The instructions given below are for a full database backup and restore.

10.1 Database on Oracle

We can use the Oracle Data Pump technology for Oracle 10g, 11g, 12c, 18c and 19c database.

First create an Oracle directory BACKUP_DIRECTORY that points to an operating system directory on the database server machine for reading and writing files.

Assume ORCL is the database server name or SID.
```
Sqlplus.exe / as sysdba
    CREATE OR REPLACE DIRECTORY BACKUP_DIRECTORY as 'E:/Databases/Backups/Oracle';
    GRANT read, write ON DIRECTORY BACKUP_DIRECTORY TO MM;
```

Then use Oracle Data Pump (expdp, impdp) to backup and restore the OMM metadata repository.

Backup

To backup (export) the OMM metadata repository database to a file MM.dmp and write the export log to expdpMM.log in the operating system directory E:/Databases/Backups/Oracle:
```
    expdp MM/MM123! schemas=MM directory=BACKUP_DIRECTORY dumpfile=MM.dmp logfile=expdpMM.log
```

Restore

Before you restore the backup to the OMM repository database, you need to drop the schema MM to delete existing objects and data from the OMM repository database. Restore will recreate the schema MM.
```
    Sqlplus.exe SYS@ORCL as SYSDBA
      DROP USER MM CASCADE;
```

To restore (import) the OMM metadata repository database from a file MM.dmp and write the import log to impdpMM.log in the operating system directory E:/Databases/Backups/Oracle:
```
    Impdp schemas=MM directory=BACKUP_DIRECTORY dumpfile=MM.dmp logfile=impdpMM.log
```

When prompted for Username, enter / as sysdba.

You may refer to the Oracle Data Pump documentation for more details on the expdp and impdp commands. Backup Restore using Recovery Manager (RMAN) You may also use the Oracle Recovery Manager (RMAN) to backup and restore your OMM repository database. It is a good practise to create a separate table space for

OMM repository database and restore only from that table space. For more information refer to the Oracle Database Backup and Recovery User's Guide.