

This document contains information on installing and implementing the Entero MOSAIC application and database, and specifies hardware recommendations for MOSAIC deployment. The document should be revised at least once a year.

Typically an initial implementation is done in conjunction with support from Entero's MOSAIC Client Services Team. Assistance and further information can be obtained by contacting MOSAIC Support at [MOSAIC-support@entero.com](mailto:MOSAIC-support@entero.com).

## MOSAIC Specifications

MOSAIC is a 2-tier application comprised of a Java desktop client connecting to an Oracle database.

### MOSAIC Desktop

MOSAIC Desktop Client Installation MSI: 170 MB

MOSAIC Desktop Client Installed: 300 MB

- User Settings are stored in the Windows, User | Application Data folder
- MOSAIC relies on a bundled JRE. There is no need to maintain external JRE synchronization.

*NOTE:* MOSAIC can be run as a simple desktop installation, or through **Citrix** or similar service.

For Citrix installations, Mosaic set up is exactly the same as a normal desk top deployment. In addition, each user should have permission to write to a folder on the Citrix machine to support normal Mosaic usage such as storage of temporary files and export reports or storage of other files needed for data loading into Mosaic. We recommend you discuss requirements for any Citrix implementation with MOSAIC Client Services prior to set up.

### MOSAIC Desktop Hardware (64 bit)

- Processor (CPU):
  - Minimum: 2 Logical Processors
  - Recommended: 4 Logical Processors (or more)
- Memory (RAM):
  - Minimum: 8 GB
  - Recommended: 12 GB (or more)
- Free Disk Space: 2 GB on Hard Drive
- Screen Resolution: 1024x768 pixels
- Operating System: Windows (7, 8, 10)

## Parallel Processing

---

Mosaic can be configured to use Parallel Processing to dramatically improve the runtimes for CPU intensive processes, like Economic Evaluations, Reconciliations, and Approving/getting Working copies of entities.

Most clients appreciate the increased speed of utilizing these settings, particularly Power Users working with larger data sets, and Administrators who often work with the entire corporate data set. Whether parallel processing will be used across the user base must be discussed when planning MOSAIC installation(s), because more powerful processors with more cores will be required on PCs and servers where MOSAIC parallel processing is used.

The optimum Parallel Processing settings are determined by the underlying CPU architecture that is running the Mosaic client, which can be a physical desktop, laptop or multi-user environment like Citrix, or Windows terminal services. Careful consideration is required for multi-user environments, especially VM-based hosts and must take in to account the processing capacity (number of cores) of the underlying host.

## Oracle

---

Oracle Standard Edition is recommended, however if the client already has Oracle Enterprise Edition, it may be used also. MOSAIC Client Services should be contacted to help determine the ideal configuration. A variety of maintenance scripts must be installed along with MOSAIC to ensure efficient performance of MOSAIC on Oracle. MOSAIC Client Services technical staff should be consulted to assist in the setup of any MOSAIC Oracle implementation and maintenance scripts.

## Oracle Server Hardware (Company with 0 – 2,500 entities):

---

- Oracle: 10g (SE), 11g (SE) or 12c (SE)
- Processor (CPU): 2 Cores (or more)
- Memory (RAM): 4 GB (or more)
- Free Disk Space: 40 GB on Hard Drive
- Operating System: Windows (7, 8, 10)

## Oracle Server Hardware (Company with 2,500 – 5,000 entities):

---

- Oracle: 10g (SE), 11g (SE) or 12c (SE)
- Processor (CPU): 4 Cores (or more)
- Memory (RAM): 8 GB (or more)
- Free Disk Space: 100 GB on Hard Drive
- Operating System: Windows (7, 8, 10)(64 bit), Linux (64 bit)

## Oracle Server Hardware (Company with 5,000 – 10,000 entities):

---

- Oracle: 10g (SE)(64 bit), 11g (SE)(64 bit), or 12c (SE)(64 bit)
- Processor (CPU): 8 Cores (or more)
- Memory (RAM): 16 GB (or more)
- **Disks: 15K SAS RAID 10 or SSD RAID 5\*\***
- Disk Type: Solid State highly recommended
- Free Disk Space: 500 GB on Hard Drive
- Operating System: Windows Server (2008/2011/2012)(64 bit) or UNIX (64 bit) or Linux (64 bit)

## Oracle Server Hardware (Company with >10,000 entities):

---

- Oracle: 10g (EE)(64 bit), 11g (EE)(64 bit), or 12c (EE)(64 bit)
- Processor (CPU): 16 Cores (or more)
- Memory (RAM): 32 GB (or more)
- **Disks: 15K SAS RAID 10 or SSD RAID 5\*\***
- Disk Type: Solid State
- Free Disk Space: 1000 GB on Hard Drive
- Operating System: Windows Server (2008/2011/2012)(64 bit) or UNIX (64 bit) or Linux (64 bit)

\*Speed and performance depends on the number of power users for each company. All recommendations are based on a maximum of 5 power users. Power users for these purposes are defined as users who would be evaluating and running reports on the maximum number of entities for each specification settings.

The size of the disk space requirement is based on standard procedures and include allowance for significant Entity detail and expectation of economic results for a reasonable number of complete portfolio scenarios.

\*\*MOSAIC is an Enterprise-level application and contains many write intensive activities such as running economics, changing entity state and multi-editing inputs. At critical times in the business calendar, multiple users will be running write intensive activities to the database at the same time. RAID 6 is not recommended as it has a significant write penalty of 6:1. This means that every write is 6 times slower than a write would be to the same disks with RAID 0 (no write penalty).

We have diagnostics from client schemas to support the following as sample input/output ratios:

- - ~100 IO/Sec per user.
  - 50%-50% read write split.
  - i.e. 10 users running heavy loads concurrently is 1000 IO/sec – 50%-50% read write split.

## MOSAIC Tablespace Setup and Space Requirements

For a medium to large client, Oracle tablespaces should be setup to start as shown below. Please contact the MOSAIC Support team or your client manager if you have questions on your particular requirements.

MOSAIC\_DATA = 200 GB

MOSAIC\_INDX = 100 GB

TEMP = 60 GB

UNDO = 60 GB

## MOSAIC Roles and Schema Permissions

MOSAIC requires specific permissions to function correctly. To assist the client database administrator in setting up the permissions correctly, a set of scripts has been created.

## MOSAIC Schema Setup

### 1.) Create the MOSAIC\_DATA and MOSAIC\_INDX tablespace

```
CREATE TABLESPACE MOSAIC_data
DATAFILE 'D:\ORACLE\ORADATA\MI1\MOSAIC_data01.dbf' SIZE 2000M
AUTOEXTEND ON NEXT 100M MAXSIZE 10000M
EXTENT MANAGEMENT LOCAL SEGMENT SPACE MANAGEMENT AUTO PERMANENT ONLINE;
```

```
CREATE TABLESPACE MOSAIC_indx
DATAFILE 'D:\ORACLE\ORADATA\MI1\MOSAIC_indx01.dbf' SIZE 1000M
AUTOEXTEND ON NEXT 100M MAXSIZE 10000M
EXTENT MANAGEMENT LOCAL SEGMENT SPACE MANAGEMENT AUTO PERMANENT ONLINE;
```

### 2.) Create the ENTERO\_SCHEMA\_OWNER role

```
create role ENTERO_SCHEMA_OWNER;
grant create session to ENTERO_SCHEMA_OWNER;
grant analyze any to ENTERO_SCHEMA_OWNER;
grant create view to ENTERO_SCHEMA_OWNER;
grant resource to ENTERO_SCHEMA_OWNER;
grant select_catalog_role to ENTERO_SCHEMA_OWNER;
grant create sequence to ENTERO_SCHEMA_OWNER;
grant create evaluation context to ENTERO_SCHEMA_OWNER;
```

### 3.) Create the MOSAIC01 schema

```
CREATE user MOSAIC01
identified by entero
default tablespace MOSAIC_data
temporary tablespace temp;
```

```
GRANT entero_schema_owner to MOSAIC01;
GRANT unlimited tablespace to MOSAIC01;
```

- Import in the MOSAIC database from the dump file

## 4.) Create the MOSAIC\_DB schema

```
CREATE user MOSAIC_DB
identified by entero
default tablespace MOSAIC_data
temporary tablespace temp;
```

```
GRANT entero_schema_owner to MOSAIC_DB;
GRANT unlimited tablespace to MOSAIC_DB;
GRANT select any table to MOSAIC_DB;
```

## 5.) Create 4 tables in the MOSAIC\_DB schema

```
CREATE TABLE MOSAIC_DATABASE
(
MOSAIC_DATABASE_ID NUMBER(12,0) NOT NULL,
DATABASE_NAME VARCHAR2(250) NOT NULL,
LOGIN VARCHAR2(100) NOT NULL,
PASSWORD VARCHAR2(50) NOT NULL,
DATASOURCE VARCHAR2(250) NOT NULL,
FIREWALL_SERVER_ADDRESS VARCHAR2(250),
FIREWALL_SERVER_PORT NUMBER(9,0),
SERVER_ADDRESS VARCHAR2(250) NOT NULL,
SERVER_PORT NUMBER(9,0) NOT NULL,
CONNECTION_MANAGER_FLAG NUMBER(1,0) DEFAULT 0 NOT NULL,
DATABASE_VERSION VARCHAR2(25) DEFAULT NULL
) TABLESPACE MOSAIC_DATA;
```

```
CREATE TABLE MOSAIC_SYSTEM_SETTINGS
(
NETWORK_DOMAIN VARCHAR2(250),
LDAP_SERVER VARCHAR2(250),
COMPANY_NAME VARCHAR2(250),
EMAIL_SERVER VARCHAR2(250),
EMAIL_SERVER_PORT VARCHAR2(10)
) TABLESPACE MOSAIC_DATA;
```

```
CREATE TABLE DISPLAY_DB_BY_USER
(
MOSAIC_USER_ID NUMBER(12) NOT NULL,
MOSAIC_DATABASE_ID NUMBER(12) NOT NULL
)
TABLESPACE MOSAIC_DATA;
```

```

CREATE TABLE MOSAIC_USER
(
MOSAIC_USER_ID NUMBER(12) NOT NULL,
WINDOWS_USERNAME VARCHAR2(100) NOT NULL,
LICENSE VARCHAR2(100)
)
TABLESPACE MOSAIC_DATA;

CREATE SEQUENCE PK_MOSAIC_USER
MINVALUE 1 MAXVALUE 9999999999
START WITH 100 INCREMENT BY 5 CACHE 25;

```

## Oracle Maintenance

**1) Recommended nightly job for Oracle Clean up and writing of table stats. For optimized MOSAIC performance, ensures there are no histograms created for any columns and that table stats are re-gathered every night.**

```

-- *****
--grant SELECT ON DBA_TABLES to system;
--grant SELECT ON DBA_USERS to system;
--grant SELECT ANY TABLE to system;
--grant DROP ANY TABLE to system;
--grant DELETE ANY TABLE to system;
--grant ALTER ANY TABLE to system;
--grant ANALYZE ANY to system;
-- *****

```

```

CREATE OR REPLACE PROCEDURE Mosaic_Jobs IS

```

```

TYPE cur_typ IS REF CURSOR;
cur cur_typ;
strSQL VARCHAR2(2000);
strUserName VARCHAR2(100);

```

```

BEGIN

```

```

strSQL := 'SELECT db.username FROM dba_users db, mosaic_db.mosaic_database m WHERE db.
username = UPPER(m.login)';

```

```

OPEN cur FOR strSQL;
LOOP
FETCH cur INTO strUserName;
EXIT WHEN cur%NOTFOUND;

-- Truncate the Report_Entity table
EXECUTE IMMEDIATE 'TRUNCATE TABLE ' || strUserName || '.report_entity';
COMMIT;

-- Gather Table statistics
dbms_stats.gather_schema_stats
(strUserName, estimate_percent=>DBMS_STATS.auto_sample_size, method_opt=>'FOR ALL
COLUMNS SIZE 1', degree=>3, CASCADE=>true, options=>'GATHER');

END LOOP;
CLOSE cur;

END Mosaic_Jobs;
/

BEGIN
DBMS_SCHEDULER.create_job
(
job_name => 'MOSAIC_JOBS_1900',
job_type => 'PLSQL_BLOCK',
job_action => 'BEGIN Mosaic_Jobs(); END;',
start_date => SYSTIMESTAMP,
repeat_interval => 'freq=daily; byhour=19',
end_date => NULL,
enabled => TRUE,
comments => 'Run Mosaic_Jobs at 7:00 pm'
);
END;
/

```

## System Configuration

MOSAIC provides a variety of security tools and methods that are managed centrally by the MOSAIC Administrator.



# Security within MOSAIC

---

## LDAP/Active Directory

MOSAIC can be administered and deployed centrally using Active Directory. Additionally MOSAIC can authenticate against LDAP/Active Directory user security profiles.

## User Profiles

Each MOSAIC schema requires configuration for each user, via assignment of roles, to enable access to all or portions of the MOSAIC system. The roles are defined by granting Data and Functional security rights. These roles can be defined in one schema, then subsequently exported and imported into other MOSAIC schemas.

## Data Security

MOSAIC allows limitation of access to data within MOSAIC by tagging rights through Entity attributes. Roles can be granted Read, Edit or Approval rights for any subset of Entities in the database. In absence of specified access, data will be hidden from users.

## Functional Security

MOSAIC provides options to limit access to specific functions – including data imports, price deck editing, and global editing features, etc. – through the Functional Security process. Roles are defined to provide bundles of functional access, which can then be assigned to users.

## User Licensing

MOSAIC licenses are maintained on the Licence Server at the Entero offices. Once created, licenses are automatically renewed upon each user login, and set for a 30 day expiry or until the end of the lease period, whichever ever comes first. Licenses can be created by Entero MOSAIC Client Services or can be configured to be auto-granted if certain criteria (Company ID, IP range, etc.) are met. Licensing terms are determined by the MOSAIC Software Agreement.

To set up your system to allow Mosaic Licensing, your Firewall and Proxy server needs to be configured to allow the url below to be accessed by the user desktop.

url: <https://mosaic-ws2.entero.com>

IP: 66.46.111.137

Port: 443

## User Connection Management

MOSAIC provides functionality allowing administrators to see who is actively connected to MOSAIC, facilitating the coordination of notification/execution of on demand maintenance and backups.

## External Data Connectivity

MOSAIC provides direct access to 3<sup>rd</sup> party databases including:

- IHS Data Hub
- geoLOGIC gDC data hub
- Divestco data sources
- Envision Accounting
- Triangle Accounting
- PVR
- Avocet
- Qbyte Accounting
- GeoWebworks

Additionally there are a variety of import and export methods for getting data in and out of MOSAIC via the client interface – from sources including public/datavendor flat files (e.g. Accumap, geoSCOUT, AssetBook, IHS, DRI//HPDI, etc.), generic production history data, and custom MOSAIC templates. The MOSAIC data structure is fully open and well documented. Entero MOSAIC Client Services is available to assist in designing custom connections, data inserts and extracts.

## Using MOSAIC Data with Third Party Tools

MOSAIC's open database allows for considerable 3<sup>rd</sup> party tool integration with MOSAIC data. It is important to note that there are data constraints on a functional level that need to be met when inserting data into a MOSAIC schema. It is best to obtain information and advice from Entero on particular data insertions to ensure the integrity of the data.

Extraction of data, appending views, and applying analytic or reporting tools to MOSAIC is a straightforward process, using the MOSAIC ERD and related documentation ([Entero MOSAIC Database Structure and Data ID Notes for 3rd Parties](#)). The MOSAIC ERD and Database Structure and Data ID Notes for 3rd Parties documentation are available from MOSAIC Client Services upon request.

## New Versions and Upgrades

In general Entero provides one major upgrade per year, with updates and patches as needed. In years with extensive updates to North American fiscal models, updates may reach a dozen, but commonly 3-6 updates are expected to be released. It is important to note that minor version updates do not require a change to the database, nor do they significantly alter functionality, hence do not require additional training. Generally clients will update once or twice during the year, between major releases. There is no expectation that clients will accept each release, installing updates only when their deployment processes allow.