# Contents

## Preface

<table>
<thead>
<tr>
<th>Audience</th>
<th>vi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation Accessibility</td>
<td>vi</td>
</tr>
<tr>
<td>Related Resources</td>
<td>vi</td>
</tr>
<tr>
<td>Conventions</td>
<td>vii</td>
</tr>
</tbody>
</table>

## 1 Introduction to Oracle Spatial Studio

| 1.1 About Oracle Spatial Studio | 1-1 |
| 1.2 Spatial Studio Terminology | 1-1 |
| 1.3 Spatial Studio Metadata and Connection Management | 1-2 |

## 2 Administering Oracle Spatial Studio

| 2.1 Prerequisites and Recommendations for Spatial Studio | 2-2 |
| 2.2 Downloading and Installing Spatial Studio | 2-2 |
| 2.2.1 Installing and Configuring the Spatial Studio Quick Start | 2-2 |
| 2.2.2 Installing Spatial Studio to a WebLogic Server Domain | 2-4 |
| 2.2.2.1 Preventing a Spatial Studio Admin User from General WLS Administration | 2-5 |
| 2.3 Setting Up the Spatial Studio Metadata Schema | 2-5 |
| 2.4 Connection Requirements for Database Users of Spatial Studio | 2-7 |
| 2.5 Changing the Configuration Using the sgtech_config.json File | 2-7 |
| 2.5.1 Allow HTTPS-ONLY Access | 2-7 |
| 2.5.2 Connecting to the Spatial Studio Metadata Schema | 2-8 |
| 2.5.3 Caching Metadata Objects | 2-8 |

## 3 Using Oracle Spatial Studio

| 3.1 Getting Started Using Spatial Studio | 3-2 |
| 3.2 Spatial Studio Projects Page and Active Project | 3-3 |
| 3.3 Spatial Studio Data Page | 3-4 |
4 Spatial Studio Accessibility Information

4.1 About Oracle Spatial Studio Accessibility 4-1
4.2 Oracle Spatial Studio Features that Support Accessibility 4-1
  4.2.1 Keyboard Access with Spatial Studio 4-1
  4.2.2 Screen Reader Readability with Spatial Studio 4-2
  4.2.3 Flexibility in Font and Color Choices with Spatial Studio 4-2
  4.2.4 No Audio-only Feedback with Spatial Studio 4-2
  4.2.5 No Dependency on Blinking Cursor and Animation with Spatial Studio 4-2
  4.2.6 Screen Magnifier Usability with Spatial Studio 4-2
4.3 Highly Visual Features of Oracle Spatial Studio 4-2

A Third-Party License Information for Spatial Studio

Index
### List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>WLS Admin Console for Deploying Spatial Studio</td>
<td>2-4</td>
</tr>
<tr>
<td>3-1</td>
<td>Create Button</td>
<td>3-1</td>
</tr>
<tr>
<td>3-2</td>
<td>Spatial Studio Main Page</td>
<td>3-2</td>
</tr>
<tr>
<td>3-3</td>
<td>Active Project Page with Options Menu</td>
<td>3-3</td>
</tr>
<tr>
<td>3-4</td>
<td>Active Project Page Icons</td>
<td>3-4</td>
</tr>
<tr>
<td>3-5</td>
<td>Data Page, Including Dropdown Menus</td>
<td>3-4</td>
</tr>
</tbody>
</table>
Preface

• Audience
• Documentation Accessibility
• Related Resources
• Conventions

Audience

This document is intended for users of the Spatial Studio tool who have one or more of the following responsibilities:

• Administering Spatial Studio. Such users install the tool, and create and manage database users of the tool.
• Using Spatial Studio. Such users are typically data analysts or application developers, or both.

Tip:

If you choose to print the PDF version of this book, and if you do not want to include the licensing details in the printout, print only pages 1 (title page) through the last page of the last chapter. (Most of the content of the book consists of license details in Appendix A.)

Documentation Accessibility

For information about Oracle’s commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Resources

For more information, see these Oracle resources:
Conventions

The following text conventions are used in this document:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>boldface</strong></td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.</td>
</tr>
<tr>
<td><em>italic</em></td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td><code>monospace</code></td>
<td>Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.</td>
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</tbody>
</table>
1

Introduction to Oracle Spatial Studio

Oracle Spatial Studio is a graphical tool for working with spatial data in Oracle Spatial and Graph format.

- **About Oracle Spatial Studio**
  Oracle Spatial Studio, also referred to as Spatial Studio, is a free tool that lets you connect with, visualize, explore, and analyze geospatial data stored in and managed by Oracle Spatial and Graph.

- **Spatial Studio Terminology**
  The key concepts and domain objects of Oracle Spatial Studio are the following.

- **Spatial Studio Metadata and Connection Management**
  Spatial Studio stores all of its own metadata (such as the definitions of all the datasets and connections created by different users) in a single Oracle Database schema known as the metadata schema, or repository.

1.1 About Oracle Spatial Studio

Oracle Spatial Studio, also referred to as Spatial Studio, is a free tool that lets you connect with, visualize, explore, and analyze geospatial data stored in and managed by Oracle Spatial and Graph.

Spatial Studio is a multiuser Java EE application that can be used as a standalone tool (Quick Start) or deployed to WebLogic Server.

Before you can use Spatial Studio, you must download the kit from Oracle Technical Resources (formerly called Oracle Technology Network), install the software, and perform certain administrative actions like creating database users that are authorized to use the tool, and managing those users.

**Note:**

Spatial Studio is **not** the Spatial and Graph map visualization component (formerly called "MapViewer"), which is not an end-user "tool" but rather a separate and distinct component.

The map visualization component is documented in *Oracle Spatial and Graph Map Visualization Guide*.

1.2 Spatial Studio Terminology

The key concepts and domain objects of Oracle Spatial Studio are the following.

- **Connection**: Connections are user-created; they provide details so that the Spatial Studio can load user data from an external data source, typically a specific database schema.
• **Dataset**: A dataset is the basic organizational unit of a user’s data.

• **Project**: A project is where data visualization and analysis occur. It represents a “workspace” that can be saved and reopened.

• **Published Project**: A published project is a snapshot of the visualizations and analyses that a user has created in a project. It provides an easy way of sharing what users have created within their organization.

• **Analysis**: An analysis is typically one or more (spatial) operations performed on one or more datasets. The operation types and their parameters for an analysis are all stored as part of a project. The result of any analysis can be visualized, just like any other dataset.

• **Metadata schema (repository)**: The metadata schema for Spatial Studio is an Oracle Database that contains the repository where all Spatial Studio metadata is centrally managed.

• **User**: Spatial Studio’s end users, which are typically business analysts and administrative users. These users are NOT database schema owners; rather they are application users, whose information is typically stored in an LDAP-like directory and whose authentication is carried out by WebLogic Server.

### 1.3 Spatial Studio Metadata and Connection Management

Spatial Studio stores all of its own metadata (such as the definitions of all the datasets and connections created by different users) in a single Oracle Database schema known as the metadata schema, or repository.

This metadata schema is one that Spatial Studio must be able to connect to during initial startup, because all of its essential metadata and states are stored there. This metadata schema can be an Oracle Database devoted solely to Spatial Studio use, or it can be any schema potentially used for other purposes as well, as long as the schema is provisioned for use by Spatial Studio, with the minimum necessary privileges.

The main types of connections are created by Spatial Studio’s end users so that they can gain access to a set of data tables stored in potentially several different database schemas, and explore them together in a single project. For each such user-created connection, only its connection details are stored in Spatial Studio’s metadata schema, while no actual (raw) data is ever copied or extracted into the metadata schema.

If a schema user name and password are specified when a connection is created in Spatial Studio, this information is securely encrypted before being stored in the metadata schema tables. When a user opens a project that depends on datasets originated from such a connection, then the password is decrypted at that time and a new JDBC connection pool is established. This connection pool is then used by Spatial Studio to run queries against the target table(s) from that connection whenever needed.

A connection can be marked as private. With a **private connection**, only the user that created the connection can access it (either in a project or anywhere else). For example, if User A creates a private connection, then User B will not be able to see or use that private connection or any data from the connection.
Administering Oracle Spatial Studio involves certain actions that must be performed before non-administrative users can work with spatial data. If you are an administrative user of Spatial Studio, you must:

- Download the Oracle Spatial Studio application from Oracle Technical Resources (formerly called Oracle Technology Network) and install it.
- Set up a database schema to be the Spatial Studio schema, that is, to hold metadata for Spatial Studio. The Spatial Studio schema can be either an existing database schema in which Spatial Studio metadata will be added, or a newly created schema that will be used only for Spatial Studio.
- Configure the newly installed Spatial Studio application. When the installation and configuration actions are completed, users can connect to the database, start Spatial Studio, and use its features.

**Note:**

The Spatial Studio application can be downloaded in either of the following formats:

- **Quick Start:** A ready-to-run standalone application packaged in a zip file containing what you need to launch the Spatial Studio web application on your desktop. (You will still need to have JDK 8 64-bit, update 181 or later installed on your desktop, because no Java kit is bundled with this kit.) Quick Start is well suited for personal and development use.
- **A WLS-optimized EAR (Enterprise Application aRchive) file.** This .ear file can be deployed to an existing WebLogic Server domain administered by an organization’s WLS or middleware administrator. This is the recommended installation and deployment method if you intend for multiple end users to access the same Spatial Studio web application.

A given person or database user can be *both* an administrative user and a non-administrative user, or can be *only* an administrative user or a non-administrative user.

- **Prerequisites and Recommendations for Spatial Studio**
  Some prerequisites and recommendations apply for using Spatial Studio.
- **Downloading and Installing Spatial Studio**
  Spatial Studio must be downloaded and installed before anyone can use it to perform interesting work on spatial data.
• **Setting Up the Spatial Studio Metadata Schema**
  You must set up a database schema to be the Spatial Studio schema, which will hold metadata used by the Spatial Studio application.

• **Connection Requirements for Database Users of Spatial Studio**
  Individuals who analyze spatial data or create spatial applications will want to be able to use Spatial Studio after the tool has been installed.

• **Changing the Configuration Using the sgtech_config.json File**
  By default, Spatial Studio will create (if it does not already exist) and use a JSON file named `sgtech_config.json` for most of its essential configuration information.

### 2.1 Prerequisites and Recommendations for Spatial Studio

Some prerequisites and recommendations apply for using Spatial Studio.

Oracle Spatial and Graph must be installed on the database to which any users will connect to perform actions with Spatial Studio. (It is not sufficient to have only Oracle Locator installed.)

The following additional requirements and recommendations apply:

- **Java 8 64-bit, update 181 or later.** Note that newer versions of Java (such as Java 9 or higher) have not been tested, and older versions are not supported.
- **Oracle Database 12.2 or later.** This applies both to the Spatial Studio metadata schema and to all database connections that will be used by Spatial Studio users.
- **At least the following privileges for each database user that works with Spatial Studio:**
  
  ```
  create session, connect, resource, create view, create sequence,
  create synonym, create procedure, query rewrite
  ```

### 2.2 Downloading and Installing Spatial Studio

Spatial Studio must be downloaded and installed before anyone can use it to perform interesting work on spatial data.

Go to [https://www.oracle.com/database/technologies/spatialandgraph.html](https://www.oracle.com/database/technologies/spatialandgraph.html) and find the instructions for downloading and installing Spatial Studio.

- **Installing and Configuring the Spatial Studio Quick Start**
  Quick Start is an easy method for getting started, and is well suited for personal and development use.

- **Installing Spatial Studio to a WebLogic Server Domain**
  Spatial Studio can be deployed to a WebLogic Server domain, the recommended approach if multiple end users will access the same Spatial Studio application.

### 2.2.1 Installing and Configuring the Spatial Studio Quick Start

Quick Start is an easy method for getting started, and is well suited for personal and development use.
The Quick Start is packaged in a single zip that contains everything you need to start using Spatial Studio, except for Java 8 (64-bit, update 181 or later) and your own database schemas.

The following are general steps for getting started:

1. Download the Quick Start zip archive OracleSpatialStudio_qs.zip.
2. Unzip (extract) it, which results in a directory named Oracle_Spatial_Studio.
3. Ensure that the JAVA_HOME environment variable exists on your system, and points to a full JDK installation of Java SE Development Kit 8u181 (64-bit) or later.
4. Ensure that the ports 8080 and 4040 are not being used by any other (web) applications. (You can direct Spatial Studio to use different ports, but 8080 and 4040 are the default.) Port 8080 is to used with the http:// protocol, while port 4040 is for the http:// protocol.
   Note that by default, Spatial Studio only allows access using https.
5. From a command window (Windows) or terminal (Linux or Mac), go to (cd) the Oracle_Spatial_Studio directory. This directory contains several .bat or .sh files.
6. Use start.sh or start.bat to start the application. (On Linux or Mac you may need to ensure that the .sh files are executable by first running the command: chmod u+x *.sh)
   Leave the terminal or command window open.
7. In your browser, go to the URL: https://localhost:4040/spatialstudio
   The default admin user login credentials are admin/welcome1. It is strongly recommended that you immediately change the password.

**Note:**

The following considerations apply to using the Quick Start:

- The default port is 4040, but you can change it by editing the file conf/server.json in Oracle_Spatial_Studio. You will need to restart the application after you make any change. (The same applies if you change the HTTP port value from the default 8080.)

- The Quick Start provides several predefined web user login accounts named admin, manager, author, consumer, and limited. These users and their login passwords are defined in the configuration file conf/jetty-realm.properties. You should **change the passwords immediately** after you unzip the downloaded Quick Start kit. Because the Quick Start is intended for personal use, the passwords for the end user accounts are **not encrypted**. However, all other passwords, such as those used to log into the Spatial Studio metadata schema or for any user-created connections to database schemas, are **strongly encrypted** everywhere.

- To stop the application, the preferred approach is to start a second terminal or command window, then go to the same Oracle_Spatial_Studio folder and run the stop.bat or stop.sh script.
2.2.2 Installing Spatial Studio to a WebLogic Server Domain

Spatial Studio can be deployed to a WebLogic Server domain, the recommended approach if multiple end users will access the same Spatial Studio application.

**Note:**

For the initial release of Spatial Studio, it is recommended that you deploy the Spatial Studio EAR archive (downloaded from Oracle Technical Resources) to only a single managed server in your WLS domain. In other words, you should avoid deploying Spatial Studio to a cluster with more than one managed server in it, to avoid potential cached Spatial Studio metadata becoming out of sync between the managed servers. (This limitation may be removed in a future release of Spatial Studio.)

The general approach for deploying Spatial Studio to WebLogic Server is no different from deploying any other Java EE EAR application. The easiest way to do so is by using the WebLogic Server’s Admin console with the following steps. Note that in all or most steps you can accept the default values provided by the WLS Installation Application Wizard.

1. Download the Studio EAR archive from Oracle Technical Resources or eDelivery, and save it to your local system.
2. Log into the target WLS domain’s Admin console.
3. Click the **Deployments** link on the left side.
4. Click **Install** button under the Deployments section, as shown in the following figure (note that the exact contents may be different for your instance of WLS).

![WLS Admin Console for Deploying Spatial Studio](image_url)
5. On the next page, select the Spatial Studio EAR file downloaded previously, and install it as an application (not as a library).

6. Click through the remaining steps, including selecting the proper target server. You should accept the default options in all cases unless you know exactly what you are doing. Finally, click **Save** to complete the deployment.

7. If your WLS runs in production mode, you may need to activate the changes to ensure the deployment is activated.

8. Make sure the newly deployed Spatial Studio application is marked Active; otherwise, you may need to explicitly start it from the WLS administrative console.

9. Access the Studio application using your managed server’s URL with the `/spatialstudio` context root. For example: `http://mycompany.com:7002/spatial-studio`

   • **Preventing a Spatial Studio Admin User from General WLS Administration**
     If you want to prevent a Spatial Studio administrative user from performing other general WebLogic Server administrative operations, follow the instructions in this topic.

2.2.2.1 Preventing a Spatial Studio Admin User from General WLS Administration

If you want to prevent a Spatial Studio administrative user from performing other general WebLogic Server administrative operations, follow the instructions in this topic.

The Spatial Studio application by default allows all WebLogic managed admin users (those who are in WebLogic’s **Administrators** group) to log into the Spatial Studio application and assume Admin role inside the Spatial Studio application as well.

However, in some scenarios, your organization may **not** want to provide the WebLogic Server admin account information to the user(s) that will be administering only the Spatial Studio application. In such cases, the WLS system administrator can create a new WLS group with the id value of **“SGTech_SystemAdmin”** in the default WLS security realm. Then, either create a new user or assign an existing non-WLS-admin user to this group. From then on, this user will assume the admin role of the Spatial Studio whenever logged in, but will not be able to administrate the WLS server in general.

Note that all WLS managed users will be able to log into Spatial Studio by default, but they will be limited to accessing only their own Spatial Studio objects such as connections, datasets, and projects. Administrative users of Spatial Studio will have full access to every Spatial Studio object created by everyone.

2.3 Setting Up the Spatial Studio Metadata Schema

You must set up a database schema to be the Spatial Studio schema, which will hold metadata used by the Spatial Studio application.

The Spatial Studio schema can be either an existing database schema in which Spatial Studio metadata will be added, or a newly created schema that will be used only for Spatial Studio. The recommended practice is to create a new database user that will be used only by Spatial Studio. The database user for the Spatial Studio schema must have the following privileges:
• CONNECT
• RESOURCE
• CREATE VIEW
• CREATE SEQUENCE
• CREATE SYNONYM
• CREATE PROCEDURE
• QUERY REWRITE
• CREATE SESSION

For example, when connected as a user with DBA privileges:

SQL> create user SPATIAL_STUDIO identified by <password>;
SQL> grant create session, connect, resource, create view, create sequence, create synonym, create procedure, query rewrite to SPATIAL_STUDIO;

When the Spatial Studio application starts running for the first time, it will generate a configuration file in a folder named .sgtech under the current user’s operating system home folder. The configuration file is named sgtech_config.json. This is where Spatial Studio application will be obtaining and storing the connection details in its metadata schema.

After the connection to the metadata schema is established, the Spatial Studio application will automatically check if the required tables and other database objects are already present, and if their versions are up to date with the latest Spatial Studio application software. If these tables are not found, or if the tables require migration, the Spatial Studio application will run the necessary SQL scripts to create or migrate them, all without any intervention from the user.

The Spatial Studio schema will contain the following tables and views:

• SGTECH_OBJECT: stores all the domain objects for Spatial Studio.
• SGTECH_SYS_TYPE: defines all the known types of domain objects of Spatial Studio.
• SGTECH_SYS_JSON_SCHEMA: stores JSON data schema.
• SGTECH_TASK_QUEUE: stores long-running jobs of Spatial Studio.
• SGTECH_TASK_BROKER: stores job brokers for Spatial Studio.

**Note:**

Do not add, delete, or edit any of the Spatial Studio tables or views or the data within them. They are automatically maintained by Spatial Studio, and should not be modified by users unless directed by Oracle Support.
2.4 Connection Requirements for Database Users of Spatial Studio

Individuals who analyze spatial data or create spatial applications will want to be able to use Spatial Studio after the tool has been installed.

Each such individual will need to connect as a database user that is authorized to run Spatial Studio. For each such database user, you as the Spatial Studio administrator must enable such access.

You can create new database users specifically for Spatial Studio access, or you can modify existing database users to enable Spatial Studio access, or you can do a combination of these approaches. Some examples, when connected as a user with DBA privileges:

```
SQL> create user SPATIAL_STUDIO_USER1 identified by <password>;
SQL> grant create session, connect, resource, create view, create sequence, create synonym, create procedure, query rewrite to SPATIAL_STUDIO_USER1;
-- and/or ...
SQL> alter user SCOTT grant create session, connect, resource, create view, create sequence,
    create synonym, create procedure, query rewrite;
```

2.5 Changing the Configuration Using the sgtech_config.json File

By default, Spatial Studio will create (if it does not already exist) and use a JSON file named `sgtech_config.json` for most of its essential configuration information.

This file is typically found in the operating system user's home directory, in a subfolder named `.sgtech`. This is true whether you deployed the Studio EAR to a WebLogic domain or are just using the Quick Start.

The following topics describe some important properties in the configuration file that a system administrator should be aware of.

- Allow HTTPS-ONLY Access
- Connecting to the Spatial Studio Metadata Schema
- Caching Metadata Objects

2.5.1 Allow HTTPS-ONLY Access

One of the top level properties in the sgtech_config.json config file is `https_only`. When this value is set to `true` (the default), Oracle Spatial Studio will actively monitor all incoming requests and only allow requests that were made using SSL. Normal `http://` requests will be denied.

Thus, if you tried to access the Spatial Studio application using an `http://` URL such as `http://localhost:8080/spatialstudio`, and if the value of `https_only` is set to
true, then you will not be able to log in. In fact, you will not even see the login page itself, because none of the page resources will be accessible by your browser. Similarly, all RESTful requests will be blocked unless accessed using HTTPS.

If your environment (such as WebLogic Server) supports only http access, then you can change the value of https_only to false, and make sure to restart the Spatial Studio application or the JavaEE container where Spatial Studio is deployed.

2.5.2 Connecting to the Spatial Studio Metadata Schema

Spatial Studio must have access to a set of metadata tables, such as SGTECH_OBJECT. These tables are collectively considered the repository of the Spatial Studio application. The database schema that hosts these tables is considered the metadata schema or repository schema of Spatial Studio.

Spatial Studio must be able to establish a connection to this metadata schema as the first step during startup, when the connection details are found in the sgtech_config.json file in the metadata_schema section.

In an emergency situation, you can also manually edit this section to change or correct the connection details. However, be careful whenever editing this file, because any syntax error can cause Spatial Studio to stop working or fail to restart.

2.5.3 Caching Metadata Objects

During run time as users create connections, datasets, and projects, Spatial Studio is creating, modifying, and storing a large amount of metadata (sometimes called Spatial Studio’s “domain objects”), such as the definition of a dataset and all of its columns, or the definition of a project including the full layout of all of its visualizations.

All the metadata objects are permanently stored in the metadata table SGTECH_OBJECT, but if the database must be accessed frequently (such as every time you open a project or view the properties of a dataset), performance may suffer. If this occurs, the solution is to cache frequently accessed copies of such metadata objects in memory.

The cache section of the sgtech_config.json file lets you specify whether to enable such an in-memory cache of metadata objects. If the cache is enabled, then you can further specify how many such objects can be cached and for how long. A general rule is that max_size (the maximum number of metadata objects to be cached) should be no less than 1000, but probably should not exceed 10000 unless you have a very large amount of memory allocated to Spatial Studio.
Using Oracle Spatial Studio

As a user, you can create one or more projects, each of which can define one or more spatial datasets on which to perform various spatial operations.

- A **project** contains Spatial Studio objects, such as datasets, that are logically related to some intended usage. For example, a project might be named New England Sales Territories, or Sales Territories and Customers, or Ohio Airports and Counties. When creating a project, you should know the purposes for which you want to identify and analyze spatial data in a geographic area.

- A **dataset** is a collection of spatial features of a specific usage type and geometry type. For example, datasets might include Airports represented by polygon geometries, or Roadways represented by LRS line string geometries, or Accidents represented by point geometries.

- A **connection** specifies information for connecting to an Oracle Database schema where spatial data of interest resides: user name, password, system, port, database name, and so on. (It is similar to a SQL Developer connection)

(\textit{Be sure that you understand these terms and others that are defined in Spatial Studio Terminology.})

Most pages include a **Create** button, which lets you create a project, dataset, or connection regardless of the type of page that you are currently on.

**Figure 3-1  Create Button**

Spatial Studio has an initial (main) page that provides an overview of the tool and links to tutorial resources, and several pages devoted to major user operations. The following figure shows the main page, with the navigation drawer expanded to show the left side menu of major objects that you can work on.
Navigation Drawer ("hamburger" icon, upper left):

- **Projects** (initially selected): Includes any existing Projects and Published Projects.
- **Data**: Tabs with listing details: Datasets; Connections
- **Active Project**: If you are currently working on a project, its information appears in the Active Project page.
- **Console**: Lets you monitor the status and activity of Spatial Studio, with tabs for Settings, System Status, and About.
- **Tasks**: Tabs for various "tasks" (background jobs started by Spatial Studio to implement user requests)
- **Getting Started Using Spatial Studio**
  Spatial Studio includes a page with information and links to help you get started using the tool.
- **Spatial Studio Projects Page and Active Project**
  The Projects page lists all projects that have been created, both unpublished and published.
- **Spatial Studio Data Page**
  The Data page lets you view and edit existing datasets, and create new ones.
- **Spatial Studio Console**
  The console lets you monitor the status and activity of Spatial Studio.

### 3.1 Getting Started Using Spatial Studio

Spatial Studio includes a page with information and links to help you get started using the tool.

To display this page, click the small question mark icon (?) in the top right area of most pages (above the Create button). The Get Started with Spatial Studio page includes:
• **Watch Overview**: Watching this video is perhaps the best way to grasp the user interface and see how to perform available actions.

• **Prepare Data**: Enable your business data for mapping and spatial analytics.

• **Visualize and Analyze**: Explore geographic patterns and relationships in your business data.

• **Learn More**: Visit our video library to learn more about Oracle Spatial Cloud.

### 3.2 Spatial Studio Projects Page and Active Project

The Projects page lists all projects that have been created, both unpublished and published.

To work on or see details about a project, click its icon, which makes it the Active Project.

**Layers List - Data**: For a selected active project, shows lists of datasets added. Right-click any Data item to see this context menu including: Spatial Analysis, Zoom to Layer, Cut, Paste Before, Paste After, Delete, Symbol Style, Heatmap Style, Properties.

To see data layer-related options, click the menu selector next to the layer name to display available options:

• **Settings**: Shows display options for Style, Interaction, and Legend.

• **Spatial Options**: Lets you perform many spatial operations (All, or filtered by type: Filter, Combine, Transform, Measure), such as Add a buffer of a specified distance, Return shapes having spatial relationship to another, and Calculate area.

• **Zoom to Layer**: Zooms the display (out or in) to fit the entire layer.

• **Refresh Layer**: Refreshes the layer to reflect all user actions.

• **Remove**: Removes the layer from the project.

**Figure 3-3  Active Project Page with Options Menu**
In the top right area of the Active Project display are icons for Save, Save As, Share (for publishing), and Project Settings (Name, Created By, Description):

**Figure 3-4   Active Project Page Icons**

---

### 3.3 Spatial Studio Data Page

The Data page lets you view and edit existing datasets, and create new ones.

The following figure shows the Data page:

**Figure 3-5   Data Page, Including Dropdown Menus**

To create a new dataset, click **Create**, then **Dataset**. You can create a dataset from a:

- Spreadsheet file
- Shapefile
- GeoJSON file
- Connection

For any dataset in the display, you can click the down-arrow after Last Modified Date and select from the following:

- **Properties**: View or modify properties of the dataset.
- **Create Project**: Create a new project.
- **Delete Dataset**: Delete this dataset.
- **Export Dataset**: Export this dataset (GeoJSON or CSV file format).
• Prepare (Addresses, Clear enrichment, Create Lon/Lat index, Drop Lon/Lat Index)

3.4 Spatial Studio Console

The console lets you monitor the status and activity of Spatial Studio.

To display the console, from the Navigation Drawer select Console, which includes tabs for:

• **Settings**: Service URLs, Web Proxy (details), **Update Settings** button.
• **System Status**: Long list of Property Name / Property Value pairs.
• **About**: Spatial Studio version and copyright information.
4

Spatial Studio Accessibility Information

This topic provides information on the accessibility features for Oracle Spatial Studio.

It includes the following.
• About Oracle Spatial Studio Accessibility
• Oracle Spatial Studio Features that Support Accessibility
• Highly Visual Features of Oracle Spatial Studio

4.1 About Oracle Spatial Studio Accessibility

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4.2 Oracle Spatial Studio Features that Support Accessibility

Oracle Spatial Studio provides features that are designed to support accessibility.
• Keyboard Access with Spatial Studio
• Screen Reader Readability with Spatial Studio
• Flexibility in Font and Color Choices with Spatial Studio
• No Audio-only Feedback with Spatial Studio
• No Dependency on Blinking Cursor and Animation with Spatial Studio
• Screen Magnifier Usability with Spatial Studio

4.2.1 Keyboard Access with Spatial Studio

Oracle Spatial Studio features support keyboard access to the product's functionality; a summary is provided in this section. The following menu and toolbar functionality is provided through keyboard access:
• Users can navigate to and invoke all menu items.
• All toolbar functions are accessible through menu items.
• All menus and menu items have unique and functioning mnemonic keys.
• All context menus within the navigators and source editor can be invoked.
• Frequently used menu items have unique accelerator keys.
4.2.2 Screen Reader Readability with Spatial Studio

Here is a summary of screen readability in Spatial Studio, when it is used with a screen reader.

When used with menus and toolbars:

- All menus and menu items are read.
- All toolbar items are read.
- The hint text on all toolbar items is read.

4.2.3 Flexibility in Font and Color Choices with Spatial Studio

The user interface in Spatial Studio improves usability for people who are visually impaired by offering flexibility in color and font choices. The following font and color features are included:

- Users can specify both the font and the size in which the font displays for code editors.
- All features of the product have black text on a white or gray background.
- Colored text, underlining, or images are never used as the only method of conveying information.

4.2.4 No Audio-only Feedback with Spatial Studio

In Spatial Studio, there is no situation in which the only feedback a user receives is audible feedback. All audible feedback is accompanied by a visual indicator. For example, a prompt accompanies the bell sound that occurs when an error or illegal action has taken place.

4.2.5 No Dependency on Blinking Cursor and Animation with Spatial Studio

Spatial Studio makes minimal use of a blinking cursor and animation:

- No features in Spatial Studio use blinking indicators, with the exception of the cursor in the source editor.
- No features rely on animated sequences.

4.2.6 Screen Magnifier Usability with Spatial Studio

The Spatial Studio user interface works well with screen magnifiers. All features of the product can be magnified by a screen magnifier.

4.3 Highly Visual Features of Oracle Spatial Studio

Spatial Studio includes features that are highly visual, and these features have equivalent functionality that is available to people who are blind or visually impaired, except
for the generated maps, which are only visual. However, results of an analysis can also be generated as JSON and tables, as an alternative format to the visual map.

All of the functionality is available through REST APIs.

In Spatial Studio, it is possible to create, edit, and generate an analysis result using only keystrokes.
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A-6
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The initial code for shuffling an array (originally in class "org.apache.commons.math3.random.RandomDataGenerator", now replaced by a method in class "org.apache.commons.math3.util.MathArrays") was inspired from the algorithm description provided in "Algorithms", by Ian Craw and John Pulham (University of Aberdeen 1999). The textbook (containing a proof that the shuffle is uniformly random) is available here:
http://citeseerx.ist.psu.edu/viewdoc/download;?doi=10.1.1.173.1898&rep=rep1&type=pdf

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BMPPattern.java,v 1.4 2004/02/24
Match.java,v 1.5 2004/02/24
Op.java,v 1.4 2004/02/24
ParseException.java,v 1.4 2004/02/24
ParserForXMLSchema.java,v 1.6 2004/02/24
RangeToken.java,v 1.5 2004/02/24
RegexParser.java,v 1.9 2004/02/24
RegularExpression.java,v 1.8 2004/02/24
REUtil.java,v 1.8 2004/02/24
Token.java,v 1.8 2004/02/24
message.properties, 1.6 2003/03/25

It contains the following modifications:

(1) a change in namespace.
(2) the addition of a SchemaRegularExpression class for fast
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(3) Bugfix in file ParserForXMLSchema:237

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Supercluster 3.0.2

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**ajv 6.5.3**

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flywaydb 4.2.0

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jackson-core 2.9.5

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jackson-core v. 2.9.5
Source URL: https://github.com/FasterXML/jackson-core/tree/jackson-core-2.9.5

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copyright URL: https://github.com/FasterXML/jackson-core/blob/ fa64390b1bd5f1435daa9d2b17a58594c9b22817/src/main/java/com/fasterxml/jackson/core/ Versioned.java

/* Jackson JSON-processor.
 *  *
 * Copyright (c) 2007- Tatu Saloranta, tatu.saloranta@iki.fi
 */

package com.fasterxml.jackson.core;
/**
 * Interface that those Jackson components that are explicitly versioned will implement.
 * Intention is to allow both plug-in components (custom extensions) and applications and
 * frameworks that use Jackson to detect exact version of Jackson in use.
 * This may be useful for example for ensuring that proper Jackson version is deployed
 * (beyond mechanisms that deployment system may have), as well as for possible
 * workarounds.
 */

public interface Versioned {

/**
 * Method called to detect version of the component that implements this interface;
 * returned version should never be null, but may return specific "not available"
 * instance (see [link Version] for details).
 */

Version version();

jackson-core 2.9.6

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# Jackson JSON processor

Jackson is a high-performance, Free/Open Source JSON processing library.
It was originally written by Tatu Saloranta (tatu.saloranta@iki.fi), and has been in development since 2007.
It is currently developed by a community of developers, as well as supported commercially by FasterXML.com.

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**mapbox-gl-js 0.49.0**

https://github.com/mapbox/mapbox-gl-js/blob/7c25d40b730bf3812b0bc63728b75514a92d6813/LICENSE.txt

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Appendix A

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UnitBezier

http://svn.webkit.org/repository/webkit/trunk/Source/WebCore/platform/graphics/
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 + "description": "Browserify transform for removing Flow type annotations.",
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