

Oracle® Healthcare Translational Research Notebook User's Guide



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The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

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Preface

This preface contains the following sections:

- [Documentation accessibility](#)
- [Access to Oracle Support](#)

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 Support Cloud.

Contact our Oracle Customer Support Services team by logging requests in one of the following locations:

- English interface of Oracle Health Sciences Customer Support Portal (<https://hsgbu.custhelp.com/>)
- Japanese interface of Oracle Health Sciences Customer Support Portal (<https://hsgbu-jp.custhelp.com/>)

You can also call our 24x7 help desk. For information, visit <http://www.oracle.com/us/support/contact/health-sciences-cloud-support/index.html> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

1

Overview

Oracle Healthcare Translational Research Notebook (OHTR-Notebook) is an integrated advanced data science workbook available through the new Oracle JET-based Oracle Healthcare Translational Research application called Oracle Healthcare Translational Research - Next Gen (OHTR-NG). The Notebook feature leverages Data Studio technology and comes with built in use cases. It also provides the ability for specific users to create new notebooks. This application is a single page web application built with Oracle JET technology, powered by a REST service and a distributed interpreter backend on top of the open source software, Zeppelin. Notebook extends Zeppelin's existing interpreters such as Python, R, and Scala by being able to deploy any Zeppelin interpreter completely and individually from the main server. It gives the ability to layout the notebook in either Zeppelin or Jupyter format as well as providing additional user interface capabilities. One of the key features of Oracle Healthcare Translational Research-Notebook is the Parallel Graph AnalytiX (PGX) engine, which is a toolkit for graph analysis with support for advanced parallel and high performance graph algorithms. Oracle Healthcare Translational Research-Notebook embeds PGX to enable the creation of dynamic and advanced visualization.

Data scientists can use Oracle Healthcare Translational Research-Notebook not only to use the existing use cases but also to build new use cases by creating new notebooks for their end users. The end users of the Oracle Healthcare Translational Research application can also use Oracle Healthcare Translational Research-Notebook to explore existing pre-built use cases like Patients Like Mine and Patient Journey. Oracle Healthcare Translational Research-Notebook uses the Graph Analytics and Graph Query methods to analyze clinical data present in the CDM data model of Oracle Healthcare Foundation using various interpreters.

Oracle Healthcare Translational Research-Notebook uses interpreters such as PGX-Java, PGX-Algorithm, PGQL, Markdown, Python and Oracle R.

For more information, see:

- [Architecture diagram](#)
- [How data flows from CDM to Oracle Healthcare Translational Research-Notebooks](#)
- [Data security](#)
- [User roles](#)
- [Cloning notebooks](#)
- [How to install new packages from Python](#)

Architecture diagram

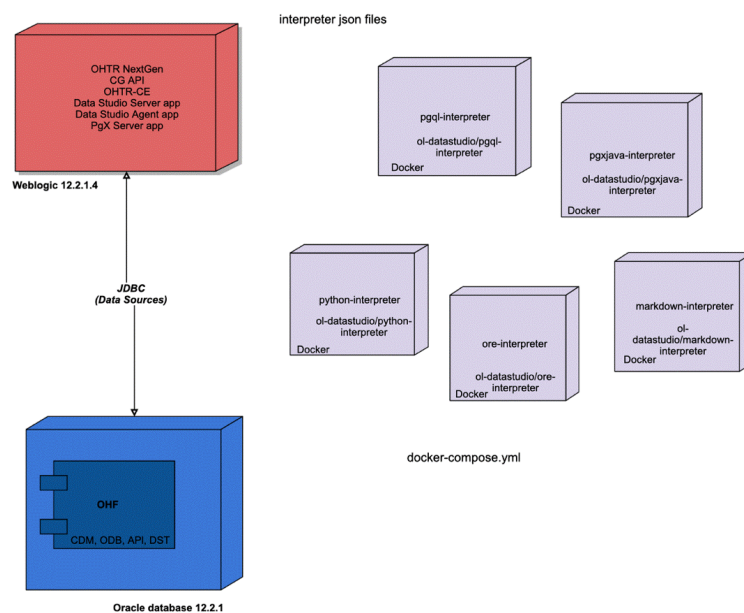
The Oracle Healthcare Translational Research-Notebook solution consists of:

- Data Studio agent and server applications
- a PxG server application

- PgX Interpreter docker containers

The war applications are deployed in the Oracle Healthcare Translational Research Middle Tier WebLogic server, alongside Oracle Healthcare Translational Research applications. The docker containers are started using docker and are managed together using docker-compose.

Deployment Diagram



How data flows from CDM to Oracle Healthcare Translational Research-Notebooks

Pre-built Oracle Healthcare Translational Research notebooks retrieve clinical data from Oracle Healthcare Foundation via two mechanisms. The data for PgX graphs is sourced from the API schema via a JDBC connection. Only de-identified (obfuscated) attribute values are used in these graphs. A separate mechanism is used to obtain records with patient details. It utilizes Python's cx-Oracle module with a configured connection to the API schema. This connection passes through a data access layer that enables authorized notebook users to retrieve original (unobfuscated) patient records.

Data security

Notebook users that are not authorized to view PHI/PII records are prevented from retrieving sensitive information for the database as all of the database connections pass through the data access layer.

 **Note:**

After patient record details are retrieved for the database and cached in the notebook they are visible to all users that have access to this notebook.

User roles

There are two roles, which must be assigned to the Oracle Healthcare Translational Research application user to get access to a notebook:

- **pgxds_admin_group:** The admin role allows the user to have access to features like creating a new notebook, editing existing notebooks (such as Patients Like Mine and Patient Journey), and installing new packages. The admin user can also view the notebooks of other users.
- **pgxds_analyst_group:** The analyst role is a read-only role where the user can only view the Patients Like Mine and Patient Journey use cases and cannot change or edit the notebooks. This user cannot create new notebooks and cannot install or update new packages. However, the user can change a patient ID and view patient information.

Cloning notebooks

The Oracle Healthcare Translational Research-Notebook solution comes with two prebuilt notebook templates - Patients Like Mine and Patient Journey. Each user logged into the Oracle Healthcare Translational Research-Notebook application gets a cloned copy of these notebooks. An analyst user can only view their notebook. An admin user can view the notebook of any user.

How to install new packages from Python

An admin user (pgxds_admin_group) that needs to install additional packages for the Python interpreter variant must create a new Python paragraph and run the following code:

```
%pythonimport subprocess, osos.environ['http_proxy'] = '<HTTP proxy>'os.environ['https_proxy'] = '<https proxy>'subprocess.call(['pip', 'install', '--user', '--no-cache', "-U", "<NEEDED LIBRARY>"])
```

For more information, see:

- [Included Packages](#)

Included Packages

Oracle Healthcare Translational Research-Notebook includes the following Python packages:

- Pandas
- Matplotlib

- Cx_Oracle

2

Oracle Healthcare Translational Research-Notebook Pre-Delivered Use Cases

This chapter provides functional details about the pre-delivered use cases provided with the Oracle Healthcare Translational Research-Notebook application. The use cases are:

- [Patients Like Mine notebook](#)
- [Patient Journey notebook](#)

Patients Like Mine notebook

Patients Like Mine is intended as a tool to help search for patients that are highly similar to a corresponding patient of interest using clinical events data. You initially chooses a patient of interest and then execute this tool to identify similar matching patients. This feature computes a similarity score for each patient based on an algorithm called Weighted Personalized PageRank (PPR).

For more information, see:

- [Underlying concepts](#)
- [What it looks like](#)

Underlying concepts

For an intuitive understanding of Weighted PPR, we first explain two graph-related techniques, namely, Random Walk and PageRank.

- **Random Walk:** A random walk on a given graph is an iterative process starting from a random vertex and in each step, either follows a random outgoing edge of the current vertex or jumps to a random vertex (since some vertices might not have any outgoing edges).
- **PageRank (PR):** This algorithm computes a distribution of a specific kind of random walk that starts from a random vertex and in each iteration, with a pre-defined probability p , jumps to a random vertex, and with probability $1-p$ follows a random outgoing edge of the current vertex. Running the page rank algorithm on a graph will generate rankings (PR value) for vertices and the numeric PR values can be viewed as "global importance" of vertices.
- **Personalized Page Rank (PPR):** This algorithm is an extension of the classical PR such that jumps are back to one of a given set of starting vertices. In a way, the walk in PPR is biased (or "personalized") towards this set of starting vertices and is more localized compared to the random walk performed in classical PR.

Lastly, the weighted variant of PPR (used in this specific notebook) assigns weights on edge types to highlight the relative importance of different edge types while executing the random walks.

What it looks like

The Patients Like Mine notebook also provides the user with the capability to adjust the weights of the clinical attributes based on their interest which would enable them to personalize the similarity search feature to their use case as shown below.

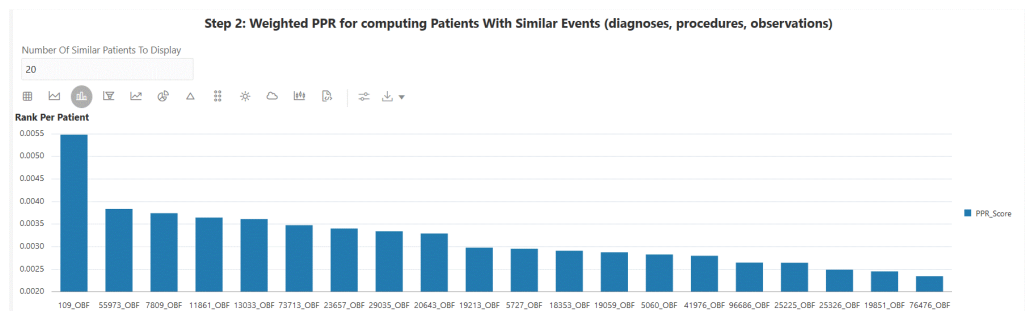
Patient Similarity Computation using Personalized PageRank on the HealthCare KG Patients like mine

Control how important different Factors are for the Similarity Computation

On the right you are able to change the weightage of some of the clinical attributes based on your interest and importance which adjusts the computation of the PPR algorithm.

patientid 55484a12f493e597e059bf8b6eb9be73	Diagnosis Weight 1.0	Procedure Weight 1.0
Anatomical Site Weight 0.8	Staging System Weight 0.2	Cancer Stage Weight 0.4
Cancer Stage Tumor Weight 0.2	Cancer Stage Node Weight 0.2	Cancer Stage Metastasis Weight 0.2
Observations Weight 1.0		

Once the weights are set and algorithm is executed, you would see a list of patients ordered with higher PPR scores as shown below.



The highest scored patients are most similar matching patients to our patient of interest. Now you can drill down further by selecting one of the matching patients and visualize the one-to-one graph with similar clinical attributes between these two patients as shown below.

Visualization Of Similar Patients Comparison

Compare To Other Patient

Patient ID
e282a758b19edbc36fb94767bbc05a7

Successful execution: No result returned.

Graphical Visualization

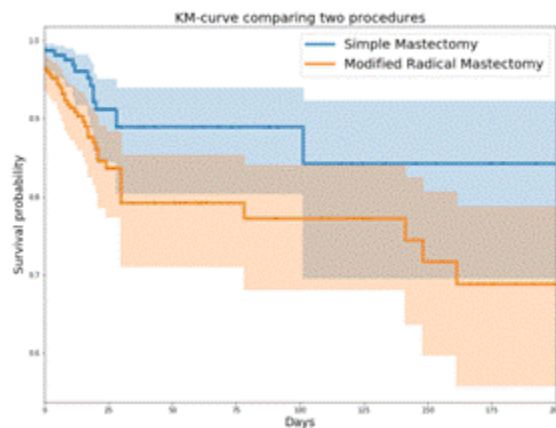
Graph Legend

- Vertices
 - Encounter
 - Cancer Stage
 - Diagnosis
 - Patient
 - Patient Diagnosis
 - Observation
 - Cancer stage metastasis
 - Anatomical Site
 - Procedure
- Edges
 - Diagnosis to Observation
 - Diagnosis to Procedure
 - e2

Finally, you can also look at which clinical attributes are matching between these two patients and which clinical attributes are different as shown below.

Factors Common Among The Two Patients			Factors Differing Among The Two Patients		
Type to search			Type to search		
Property_Name	Property_value	Patient_55484a12f493e5f	Property	Patient_55484a12f493e597e059bf8b6eb9be73_property_value	Patient_466f14f
cancer_stage_metastasis	M0		anatomical_site	BRST - LFT	BRST - LFT UPI
cancer_staging_system	6th		anatomical_site	BRST - LFT LWR OUT QDT	BRST - LFT UPI
observation	Er_Level_Cell_Percentage_Category	0.0	cancer_stage	Stage I	Stage IIIB
observation	Lymph_Node_Examined_Count	13.0	cancer_stage	Stage X	Stage IIIB
observation	Lymph_Node_Examined_Count	6.0	cancer_stage_metastasis	MX	M0
observation	Menopause_Status	0.0	cancer_stage_node	N0	N1
observation	Progesterone_Receptor_Level_Cell_Percent_Category	0.0	cancer_stage_node	NX	N1
procedure	Modified Radical Mastectomy		cancer_stage_tumor	T1c	T4
			cancer_stage_tumor	TX	T4
			diagnosis	CA Breast - Infiltrating Lobular CA	CA Breast - Infi

We also added the Kaplan-Meier estimator for comparing multiple procedures in terms of the survival probability either across similar patients or across all patients as shown below.

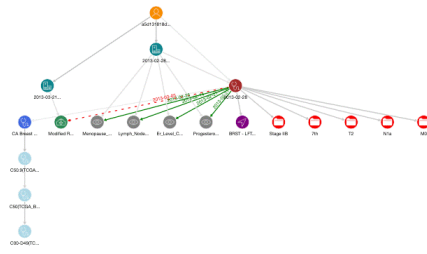


Patient Journey notebook

Patient Journey feature lists all the clinical elements of a single patient at a time in the form of a visual timeline where user can look at all the encounters and their association with clinical events like observations, diagnosis, procedures and other attributes available in the clinical Data mode.

Patient ID
a50f51818d2b7cc94f1b62c0d69f5
014

Single Patient View



- 4 Vertices
- Encounter
- Cancer Stage
- Patient
- Patient Diagnosis
- Procedure
- Diagnosis
- Anatomical Site
- Diagnosis Group
- Observation
- Cancer stage metastasis

3

Getting Started

This chapter describes how to get started with the Oracle Healthcare Translational Research-Notebook application and provides detailed information related to the various features available in Oracle Healthcare Translational Research-Notebook.

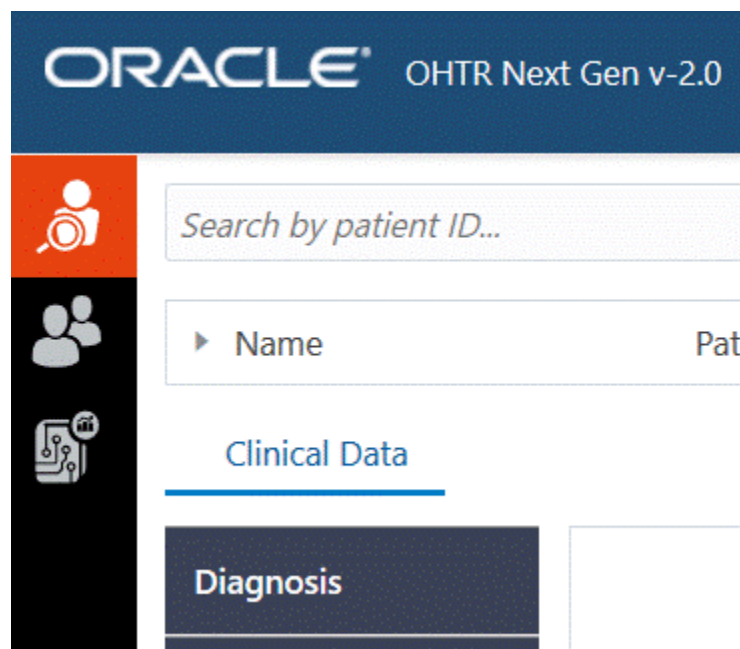
This chapter includes:

- [The Oracle Healthcare Translational Research-Notebook application](#)
- [Components of the Oracle Healthcare Translational Research-Notebook application](#)

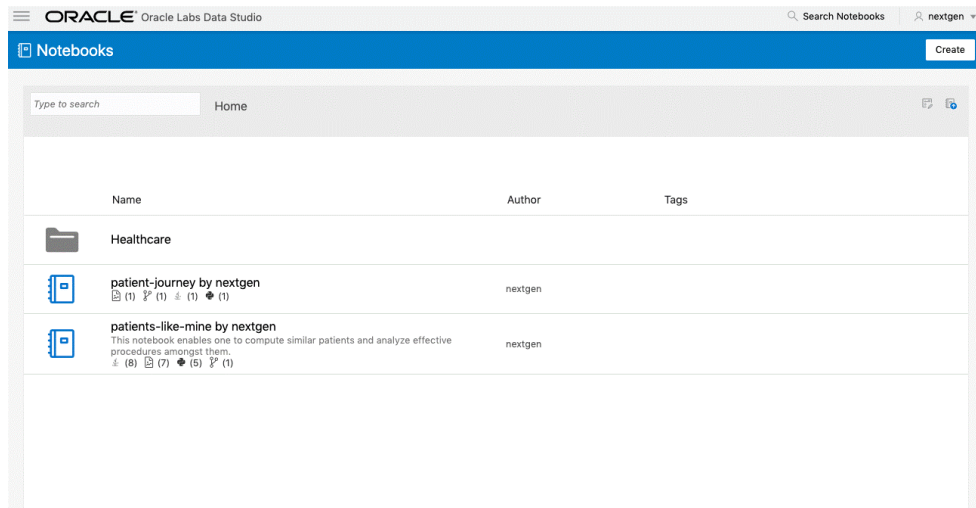
The Oracle Healthcare Translational Research-Notebook application

There are two options you can use to navigate to Oracle Healthcare Translational Research-Notebook:

1. Oracle Healthcare Translational Research-NextGen home page: You can navigate to Oracle Healthcare Translational Research-Notebook from the related link on the left side of the Oracle Healthcare Translational Research-Next Gen application. Clicking the link takes you to the Oracle Healthcare Translational Research-Notebook home page which lists your available notebooks. You are automatically logged in to the Oracle Healthcare Translational Research-Notebook application.



Clicking on the left navigation of Oracle Healthcare Translational Research-Next Gen application navigates to the Notebook home page:

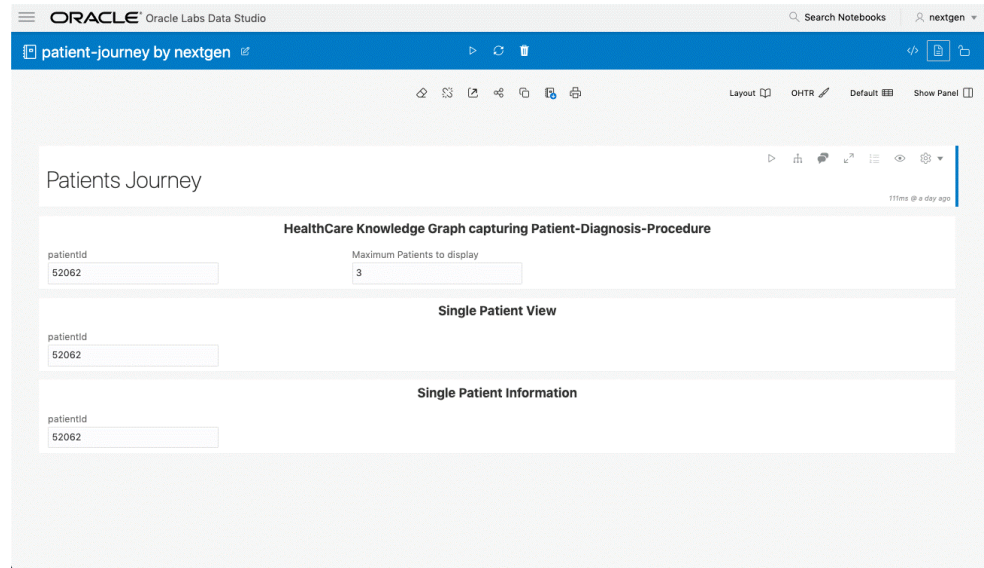


The Oracle Healthcare Translational Research-Notebook home page displays the notebooks you have created. When you first login, you see the Patient Like Mine and Patient Journey notebooks to start. This page displays the details of each notebook such as the Name, Detailed Information, Published, and Tags information. The Detailed information includes the date and time of the notebook creation, number of compilations performed using various interpreters in a notebook, and the user name of the Notebook creator.

2. Single patient viewer: From the single patient viewer screen, you can directly navigate to the corresponding notebook. The notebook links are provided in the patient details accordion.

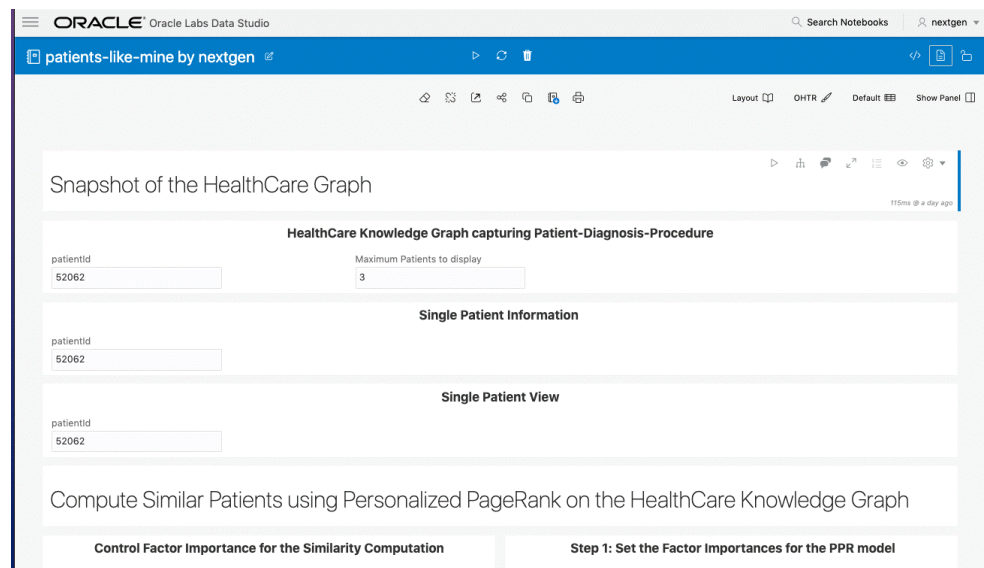


Clicking on the link image navigates directly to the notebook with the patient ID pre-recorded in the notebook.



Each paragraph can be individually run by clicking on the run button at the right top of the paragraph.

All of the paragraphs can be run together by clicking the Run button at the top (on the top blue bar).



 **Note:**

The notebooks are not pre-run when you navigate to either of the two notebooks, Patient Journey or Patients Like Mine. You must rerun the notebook whenever you navigate to these notebooks with a new Patient ID because the previous patient graph persists.

Components of the Oracle Healthcare Translational Research-Notebook application

The various components of the Oracle Healthcare Translational Research-Notebook application include the following:

- Notebooks (see [Manage Notebooks](#))
- Shared notebooks (see [Managed Shared Notebooks](#))
- Graphs (see [Manage Graphs](#))
- Templates (see [Manage Templates](#))
- Interpreters (see [Select an interpreter](#))

4

Manage Notebooks

A notebook is a collection of paragraphs. It acts as a container to hold one or more paragraphs.

This chapter includes the following sections:

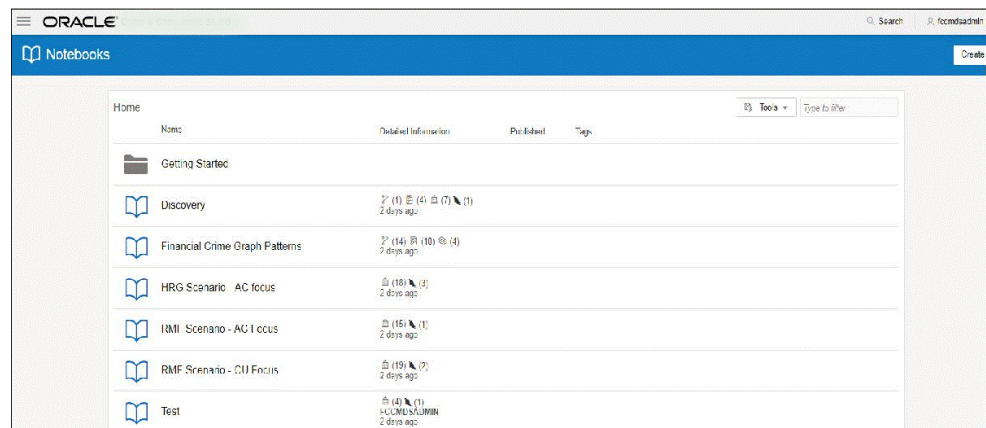
- [Create a notebook](#)
- [Import a notebook](#)
- [Export a notebook](#)
- [Common screen elements in a notebook](#)
- [Create a paragraph](#)
- [Select an interpreter](#)
- [Common screen elements in a paragraph](#)
- [Manage Results](#)

Create a notebook

A notebook acts as a frame for paragraphs. Create a notebook as follows:

1. Navigate to the Home or the Notebooks page by performing one of the following:
 - Click the **menu icon** in the upper-left corner and click **Notebooks**
 - Click the **home icon** in the upper-left corner.

The Notebooks page or the Home page is displayed.



2. Click **Create** in the upper-right corner.
The Create Notebook dialog box is displayed.
3. Enter the following details:

Table 4-1 Create Notebook Dialog Box

Field	Description
Name	Name of the notebook.
Description	Description for the notebook.
Tags	Keywords for the notebook. These keywords act as search tags when searching for the notebook.
Type	Select the type for the notebook.

4. Click **Create**.

A new notebook is created and listed in the Notebooks page.

To know more about the actions that can be performed in a Notebook, see [Common screen elements in a notebook](#).

After creating Notebook, you can create Paragraphs in a Notebook. For information on creating paragraphs, see [Create a paragraph](#).

Import a notebook

The Import Notebook feature enables you to load notebooks into the Oracle Healthcare Translational Research-Notebook application from your local machine. The file format supported for import is Data Studio Notebook (*.dsnb), which can be imported into Oracle Healthcare Translational Research-Notebook as a notebook. Using this feature, you can load any previously saved or exported notebooks.

To import a notebook into Oracle Healthcare Translational Research-Notebook:

1. Navigate to the Home page or the Notebooks page.
2. Click the **Tools** drop-down in the upper-right corner and select **Import Notebooks**.

The Import Notebook dialog box is displayed.

3. Click **Choose Files** to browse and select a file from your local machine, or drag and drop required files into the Drop files here section.

A message is displayed at the bottom of the Import Notebook dialog box to indicate that the selected files are valid for import.

4. Click **Import**.

The files are imported and displayed as notebooks in the Notebooks page.

Export a notebook

The Export notebook feature enables you to export notebooks available in Oracle Healthcare Translational Research-Notebook to your local machine. Notebooks are exported in Data Studio Notebook (*.dsnb) file format, which can be saved, shared, or imported to Oracle Healthcare Translational Research-Notebook.

You can either choose to export all the notebooks at once or export individual notebooks

For more information, see:

- [Export all notebooks](#)
- [Export individual notebooks](#)

Export all notebooks

Export All Notebooks enables you to export all of the notebooks available in the Data Studio Home to your local machine.

To export all notebooks:

1. Navigate to the Home page.
2. Click the **Tools** drop-down in the upper-right corner and select **Export Notebooks**.

All of the notebooks available in Oracle Healthcare Translational Research-Notebook are downloaded as a `datastudio_export.dsnb` file to your local machine.

Export individual notebooks

Export individual notebooks enables you to export selected notebooks in Oracle Healthcare Translational Research-Notebook to your local machine.

To export individual notebooks:

1. Navigate to the Home page.
2. Click the notebook that you want to export. The selected notebook is opened.
3. Click the save icon.

The notebook is downloaded to your local machine in `.dsn` file format.

Common screen elements in a notebook

This section provides you with details of the common screen elements available in a notebook which you can use to perform various actions in the notebook.

Table 4-2 Common screen elements in a notebook


Icon	Action/Description
The Edit icon:	Click to edit the basic details of a notebook such as the Name, Description, and Tags.
	

Table 4-2 (Cont.) Common screen elements in a notebook







Icon	Action/Description
The HTML icon:	Click to hide or display code in all of the paragraphs in a notebook.
	
The Results icon:	Click to hide or display results in all of the paragraphs in a notebook.
	
The Erace icon:	Click to clear results in all of the paragraphs in a notebook. Warning: This action clears all results. You must run the paragraphs again to view the results.
	
The Delete icon:	Click to delete a notebook.
	
The Reset icon:	Click to reset the session.
	
The Run icon:	Click to run or execute all of the paragraphs in a notebook. After execution of a notebook, you can view the results in various formats. For more information, see Manage Results .
	

Table 4-2 (Cont.) Common screen elements in a notebook








Icon	Action/Description
<p>The Copy icon:</p> 	<p>Click to create a copy of a notebook. All paragraphs in the current notebook are replicated in the new notebook. The cloned notebook is created with the default name, Copy of <Current Notebook Name>.</p>
<p>The Export icon:</p> 	<p>Click to export a notebook to your local machine. For more information, see Export individual notebooks.</p>
<p>The Share icon:</p> 	<p>Click to share a notebook with another user, user group, or role.</p>
<p>The Access icon:</p> 	<p>Click to enable or disable write access to a notebook. If enabled, the notebook is protected from edit, clear result, delete, reset session, run paragraphs, and share.</p>
<p>The iFrame icon:</p> 	<p>Click to open a notebook in iFrame.</p>
<p>The Template icon:</p> 	<p>Click to select a template for the notebook. For more information, see Apply a template to a notebook.</p>

Table 4-2 (Cont.) Common screen elements in a notebook

Icon	Action/Description
The Zeppelin or Jupyter icon: 	Click to toggle between Zeppelin and Jupyter notebooks.
The View icon: 	Click to switch between Default, Simple, and Report views.

Create a paragraph

A paragraph is a piece of code that can be executed to obtain a result. The paragraph feature offers a workbench to author code or queries using various interpreter-friendly scripting languages supported by Oracle Healthcare Translational Research-Notebook.

Paragraphs can be created using various interpreters. For more information on the supported interpreters, see [Select an interpreter](#).

Select an interpreter

Oracle Healthcare Translational Research-Notebook provides you with the option to choose between various interpreters that process data and generate output.

For more information, see:

- [Available interpreters](#)

Available interpreters

The various interpreters supported in this release are described in the following sections:

- [fcc-jdbc](#)
- [fcc-pyspark](#)
- [fcc-spark-sql](#)
- [PGX](#)
- [PGQL](#)
- [greenmarl](#)

- [fcc-ORE](#)
- [fcc-spark-scala](#)
- [Markdown](#)
- [fcc-python](#)

fcc-jdbc



Click this icon to create a paragraph with ofsaajdbc.

The ofsaajdbc Interpreter provides the following functions:

- **#help** - list available custom functions of the interpreter.
- **loadGraph (code,graphtag [--optional,date])** - load a graph for a particular date in yyyy-mm-dd format.
The return type is void and should not be assigned to any variable.
For example: `loadGraph("code","graphtag","date");`
- **listGraphs()** - list all of the available graphs in a tabular form.
Cannot be used in conjunction with any other code.
For example: `listGraphs()`
- **getGraphDetails(code)** - get graph details in a tabular form.
Cannot be used in conjunction with any other code.
For example: `getGraphDetails("code")`
- **listDatasets()** - list all available datasets in a tabular form.
Cannot be used in conjunction with any other code. For example: `listDatasets()`

fcc-pyspark



Click this icon to create a paragraph with the fcc-pyspark interpreter.

fcc-spark-sql



Click this icon to create a paragraph with the OFSAA SQL interpreter.

PGX



Click this icon to create a paragraph with the PGX interpreter.

PGQL



Click this icon to create a paragraph with the PGQL interpreter.

greenmarl



Click this icon to create a paragraph with the greenmarl interpreter.

fcc-ORE



Click this icon to create a paragraph with the fcc-ORE interpreter.

fcc-spark-scala



Click this icon to create a paragraph with the OFSAA interpreter.

This interpreter provides the following functions:

- **loadGraph(code,graphtag [--optional,date])** - load the graph for a particular date in yyyy-mm-dd format.
Return type is void and should not be assigned to any variable.For example:
`loadGraph("code","graphtag","date");`
- **saveGraphAs(graphtag, usertag)** - create a snapshot of a graph against a new tab.
The return type is void and should not be assigned to any variable.For example:
`saveGraphAs("graphtag","usertag");`
- **listGraphs()** - list all available graphs in a tabular form.
Cannot be used in conjunction with any other code.For example: `listGraphs()`
- **getGraphDetails(code)** - get the graph details in a tabular form.
Cannot be used in conjunction with any other code.For example:
`getGraphDetails("code")`
- **loadDataset(code)** - load a particular dataset.
Returns a DataFrame.For example: `var ds = loadDataset("code")`
- **loadDataset(code,date)** - load dataset for a particular date in yyyy-mm-dd format.
Returns a DataFrame.For example: `var ds = loadDataset("code","startDate","endDate")`
- **listDatasets()** - list all available datasets in a tabular form.
Cannot be used in conjunction with any other code.For example: `listDatasets()`

Markdown



Click this icon to create a paragraph with the Markdown interpreter.

fcc-python








Click this icon to create a paragraph with the fcc-python interpreter.

Common screen elements in a paragraph

This section provides you with details for the common screen elements available in a paragraph which you can use to perform various actions in a paragraph.

Table 4-3 Common screen elements in a paragraph

Icon	Action/Description
The Execute icon: 	Click to execute the code or query in a paragraph. After execution, you can view the result in various formats. For more information, see Manage Results .
The Expand icon: 	Click to expand and view a paragraph in full screen mode.
The Line Numbers icon: 	Click to show or hide line numbers in the code in a paragraph.
The Visibility Settings icon: 	Click to manage the visibility settings in a paragraph. You can choose the visibility of the title, code, result, and settings in a paragraph.
The Settings icon: 	Click to manage the widget size, placement of the paragraph, and so on. <ul style="list-style-type: none"> • Resize the widget size as per requirement. Change the order of placement of the paragraphs by moving them up or down. Clear the result generated in a paragraph. Remove or delete a paragraph in a notebook.

Manage Results

After execution of a paragraph, you can view the result in various formats.

This section contain the following topics:

- [Manage results formats](#)
- [Manage results settings](#)

Manage results formats

The details of the various result formats supported in Oracle Healthcare Translational Research-Notebook are given in the following table.

**Table 4-4 Result formats in Oracle Healthcare Translational Research-
Notebook**







Icon	Action/Description
The Tabular Format icon.	View the result in tabular format.
	
The Area Chart Format icon:	View the result in area chart format.
	
The Bar Chart Format icon:	View the result in bar chart format.
	
The Funnel Chart Format icon:	View the result in funnel chart format.
	
The Line Chart Format icon:	View the result in line chart format.
	
The Pie Chart Format icon:	View the result in pie chart format.
	

Table 4-4 (Cont.) Result formats in Oracle Healthcare Translational Research-Notebook








Icon	Action/Description
The Pyramid Chart icon:	View the result in pyramid chart format.
	
The Tree Map Format icon:	View the result in tree map format.
	
The Sunburst Chart Format icon:	View the result in sunburst chart format.
	
The Tag Cloud Chart Format tag:	View the result in tag cloud chart format.
	
The Box Plot Chart Format icon:	View the result in box plot chart format.
	
The Text Format icon:	View the result in text format.
	

Table 4-4 (Cont.) Result formats in Oracle Healthcare Translational Research-Notebook

Icon	Action/Description
	Download the result in raw or SVG format.

Manage results settings

In Oracle Healthcare Translational Research-Notebook, you can customize the result format based on your requirements. For example, you can set the number of items per page for a tabular result format.

To customize result format:

1. Navigate to the Notebooks page.
2. Click the required result format in a paragraph and click the **Settings** icon:



The Settings dialog box is displayed.

3. Enter the required values for the General, Visualization, and Text settings.

Based on the configured settings, the view is customized for the selected result format.

5

Managed Shared Notebooks

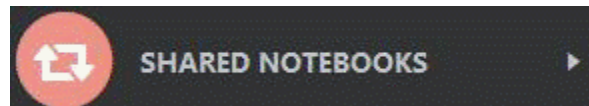
The Shared Notebooks module displays all the included standard "out of the box" notebooks and the notebooks shared with the current user. Notebooks can be shared within the current user group and other user groups.

For more information, see:

- [Access shared notebooks](#)
- [Out of the box notebooks](#)

Access shared notebooks

You can access shared notebooks from the user interface of Oracle Healthcare Translational Research-Notebook.



Accessing shared notebooks displays the notebooks available. Click any notebook to view or edit it.

Out of the box notebooks

These are the standard default notebooks included with Oracle Healthcare Translational Research-Notebook:

Table 5-1 Out of the box notebooks

Notebook Name	Description
Patient Like Mine	This notebook provides similar patients based on a patient of interest with particular clinical attributes. It gives a graphical view of the clinical events and also shows survival plots of the patients for different procedures.
Patient Journey	This notebook shows all of the clinical events of a patient in a graphical format and also allows you to view events within a specific time frame.

6

Manage Graphs

This chapter provides information on the graphs that are available from Oracle Healthcare Translational Research-Notebook. You can view the graphs that are created using Data Studio in the Data Studio interface.

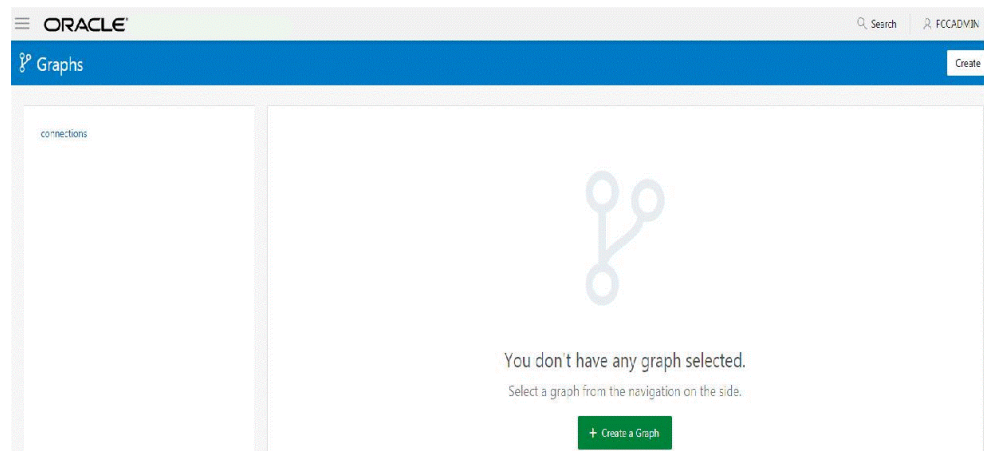
For more information, see:

- [Create graphs](#)

Create graphs

To create a graph, do the following:

1. Click the menu icon in the upper-left corner in the Home page.
The menu items are listed.
2. Click **Graphs**.
The Graphs page is displayed.



3. Click **Create a Graph**.
The Create new Graph Configuration dialog box is displayed.
4. Click the **Plain Mode** icon on the left.
5. Enter a Name for the graph.
6. Enter the JSON Configuration as shown in the following example:

```
{      "vertex_labels": false,      "edge_label": true,      "loading": {        "load_edge_label": true      },      "date_format": "yyyy-MM-dd HH:mm:ss",      "vertex_props": [        {          "type": "string",          "name": "type"        },        {          "type": "type":
```



```

"string",          "name": "religion"      },      {
  "type": "string",          "name":
"company"        },      {          "type":
"string",        "name":
"musicGenre"     },      {          "type":
"string",        "name":
"show"           },      {          "type":
"string",        "name":
"name"           },      {          "type":
"string",        "name":
"country"       },      {          "type":
"string",        "name":
"team"          },      {          "type":
"string",        "name":
"genre"         },      {          "type":
"string",        "name":
"occupation"    },      {          "type":
"string",        "name": "role"      }    ],      "edge_props":
[
  {          "type": "float",          "name":
"weight"        },      "format":
"edge_list",    "vertex_id_type": "integer",    "attributes":
{ },      "header": "",      "uri": "http://<hostname>:<port>/graphs/
connections.edge_list",      "separator": "\t "

```

7. Click **Create**.

A graph configuration is created. This newly created graph configuration can be used in a notebook for the following:

- Load a graph using the PGX interpreter.
To load a graph, create a notebook and create a paragraph with pgx interpreter. Enter the code format given in the following example:
`graph = session.readGraphWithProperties(dataSourceName, 'graphName')`
Here `dataSourceName` refers to the graph name that you have created.
- Query a graph using the PGQL interpreter.
To query a graph, create a notebook and create a paragraph with the PGQL interpreter. Enter the code format given in the following example: `SELECT n,e,m FROM GRAPH_NAME MATCH (n) -[e]-> (m)` Here `GRAPH_NAME` refers to the graph name that you have created.

7

Manage Templates

Oracle Healthcare Translational Research-Notebook offers various formats in which you can view the result after execution of a paragraph. Templates enable you to define parameters to customize the result formats. You can customize the visualization of the result by defining parameters in a template and then applying that template to a notebook. The customized parameters in the template are applied to the result format in the notebook.

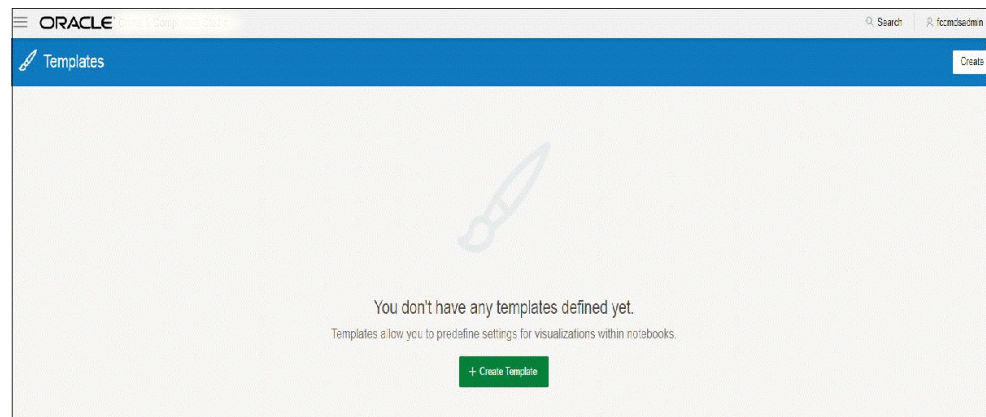
For more information, see:

- [Create a template](#)
- [Update a template](#)
- [Apply a template to a notebook](#)

Create a template

To create a template:

1. Click the **menu icon** in the upper-left corner on the Home page.
The menu items are listed.
2. Click **Templates**.
The Templates page is displayed.



3. Click **Create Template**.
The Create Template dialog box is displayed.
4. Enter a Name for the template.
5. Click **Create**.
A new template is created and listed on the left. The details of the template are displayed on the right.

6. Click the required result format icon on the right to define parameter values for that format.

For every result format in a template, you can define values for the General, Visualization, and Text parameters.

7. Enter the required values.
8. Click **Update**.

A template is created with the defined parameters.

Update a template

To update an existing template:

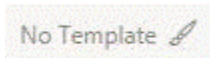
1. Navigate to the Templates page.
2. Click the template that you want to update from the list displayed on the LHS.
The details of the selected template are displayed on the RHS.
3. Modify the required values.
4. Click **Update**.

The template is updated.

Apply a template to a notebook

To apply template to a notebook:

1. Navigate to the desired notebook.
2. Click the icon in the upper-right corner.



3. Click the desired template to apply it to the notebook.