

Oracle® Cloud

Developing Integrated Spreadsheets Using Oracle Visual Builder Add-in for Excel



Version 3.5

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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.

ORACLE®

Oracle Cloud Developing Integrated Spreadsheets Using Oracle Visual Builder Add-in for Excel, Version 3.5

F77588-01

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Preface

Developing Integrated Spreadsheets Using Oracle Visual Builder Add-in for Excel describes how to develop Excel workbooks that can retrieve and modify business data exposed by a REST service and send modified data back to the service.

Topics:

- [Audience](#)
- [Documentation Accessibility](#)
- [Diversity and Inclusion](#)
- [Related Resources](#)
- [Conventions](#)

Audience

Developing Integrated Spreadsheets Using Oracle Visual Builder Add-in for Excel is intended for developers who want to create and publish Excel workbooks that integrate with enterprise applications that they use.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <https://www.oracle.com/corporate/accessibility/>.

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Related Resources

For more information, see these Oracle resources:

- [Oracle Visual Builder Add-in for Excel](#) homepage.
- Introduction to Accessing Business Objects in *Accessing Business Objects Using REST APIs*
- View and Edit Data Using an Excel Workbook in *Managing Data Using the Oracle Visual Builder Add-in for Excel*

Conventions

The following text conventions are used in this document.

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

1

What's New in Release 3.5.0

Here's an overview of new features and enhancements added to Oracle Visual Builder Add-in for Excel in Release 3.5.0. Take note also of some limitations when using the add-in.

New and Changed Features

- Support for NetSuite SuiteTalk REST web services. See [NetSuite SuiteTalk REST Web Services](#).
- Support for uploading parent and child changes in a Form-over-Table layout in the same payload for Oracle business object REST API services. See [Upload Parent and Child Changes in the Same Payload](#).
- Improvements to the New Layout Setup wizard:
 - Ability to create a set of dependent layouts during layout creation. See [Create a Set of Dependent Layouts](#).
 - Ability to add descriptive flexfields (DFFs) from a child polymorphic business object to the parent layout during layout creation. See [Create a Layout Using Descriptive Flexfields](#).
- Ability to disable batch processing for Oracle business object REST API services when uploading data. When batch processing is turned off, the add-in sends each changed row from a table in a separate request during upload. See [Disable Batch Requests for Upload](#) and [Upload Table Changes Using Separate Requests for Each Row](#).
- Support for using dynamic parameters on lists of values you create on a row finder variable. [Configure a Filter with a Dynamic Parameter](#).
- Ability to import multiple business objects to an existing catalog. See [Add Business Objects to an Existing Catalog](#).
- Ability to choose which business objects to include in a catalog for services with more than five business objects during catalog creation. [Import a Business Object Catalog](#).
- A new digital certificate with this release. See [The Digital Certificate](#).

Known Limitations

- Review [REST Service Support Limitations](#) to understand the limitations around data type support.
- Review [Notes and Limitations for Lists of Values](#) to understand limitations around using lists of values.
- Review [Custom Action Limitations](#) to understand the limitations of custom action support.
- Workbooks created or modified with version 3.5 are generally considered to be incompatible with prior versions of the add-in.

2

Introduction to Oracle Visual Builder Add-in for Excel

Oracle Visual Builder Add-in for Excel integrates Excel spreadsheets with REST services to retrieve, analyze, and edit business data from the service. You download your data to an Excel spreadsheet, work with it, then upload your changes back to the service.

Key Concepts, Components, and Terms

Before you use Oracle Visual Builder Add-in for Excel, it helps to become familiar with these key concepts, components, and terms.

Term	Description
Integrated workbook	An Excel workbook configured to work with one or more business objects.
Service	A web service that provides access to application data. The add-in works with REST services. Throughout this book, REST service is implied whenever "service" is mentioned. "Web resources" is another equivalent term. See Representational state transfer for an overview of REST.
OpenAPI	The OpenAPI Specification defines a standard, language-agnostic interface to RESTful APIs which allows both humans and computers to discover and understand the capabilities of the service without access to source code, documentation, or through network traffic inspection. Refer to the OpenAPI specification here: https://swagger.io/specification/ .
Business object	A resource - like a purchase order or invoice - that has fields to hold your application's data. A business object includes a collection path, an item path, a set of fields, and other properties.
Business object catalog	A set of one or more business objects with a common host and base path.
Path	A path identifies the specific resource in the host that a web client requests access to, for example: <code>/fscmRestApi/resources/11.13.18.05/draftPurchaseOrders</code> .
Collection path	A service path (endpoint) that can be used to fetch multiple rows of data from the business object and/or to perform operations on the collection.
Item path	A service path (endpoint) that can be used to fetch, or operate on, a single row from the business object.
Metadata path	A service path (endpoint) that can be used to fetch the service description for the business object.
Layout	A way to display a business object in an Excel worksheet. Each worksheet supports one of two layouts: Table or Form-over-Table. Layouts are created by workbook developers and are visible to business users in published workbooks.

Installation

To install the latest version of Oracle Visual Builder Add-in for Excel, download and run the installer.

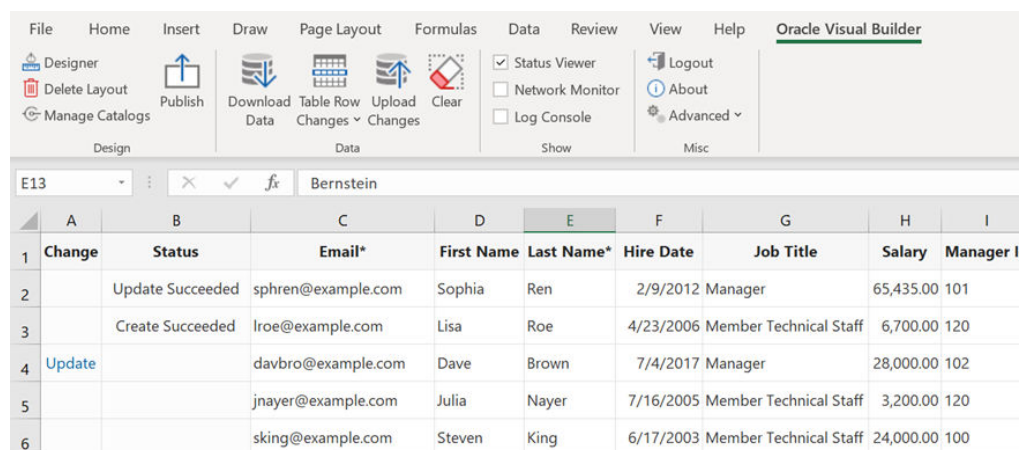
You can find the latest version of the installer at the [Downloads page](#) on Oracle.com.

For more information, refer to [Install Oracle Visual Builder Add-in for Excel](#).

Next Steps

After you install the add-in, a new **Oracle Visual Builder** ribbon tab appears in Microsoft Excel. As a workbook developer, you use the options in this ribbon tab to configure a worksheet to integrate with a service and download data to a data table that you create in the worksheet. Once the data table is created and populated with data, you can review, modify, and create data, then upload your changes to the service.

This image shows a worksheet that is integrated with an REST service that manages employees:



The screenshot shows the Microsoft Excel interface with the Oracle Visual Builder ribbon tab active. The ribbon includes sections for Design, Data, Show, and Misc. The Data section contains buttons for Designer, Delete Layout, Manage Catalogs, Publish, Download Data, Table Row Changes, Upload Changes, and Clear. The Show section has checkboxes for Status Viewer, Network Monitor, and Log Console. The Misc section has buttons for Logout, About, and Advanced. Below the ribbon, a data table is displayed with the following columns: Change, Status, Email*, First Name, Last Name*, Hire Date, Job Title, Salary, and Manager Id. The table contains six rows of employee data.

	A	B	C	D	E	F	G	H	I
1	Change	Status	Email*	First Name	Last Name*	Hire Date	Job Title	Salary	Manager Id
2		Update Succeeded	sphren@example.com	Sophia	Ren	2/9/2012	Manager	65,435.00	101
3		Create Succeeded	lroe@example.com	Lisa	Roe	4/23/2006	Member Technical Staff	6,700.00	120
4	Update		davbro@example.com	Dave	Brown	7/4/2017	Manager	28,000.00	102
5			jnayer@example.com	Julia	Nayer	7/16/2005	Member Technical Staff	3,200.00	120
6			sking@example.com	Steven	King	6/17/2003	Member Technical Staff	24,000.00	100

Here are the high-level steps you'll need to follow to create a similar data table in a worksheet:

1. In the **Oracle Visual Builder** tab, click **Designer**.
2. Provide the URL of a service description that complies with the OpenAPI specification.
3. Pick a business object.
4. Download data.

Review subsequent sections in this guide to understand available layout types and other add-in capabilities. For Excel specifications and limits, see [Microsoft documentation](#).

3

Install Oracle Visual Builder Add-in for Excel

To install Oracle Visual Builder Add-in for Excel, download and run one of the two available installers. You can download these installers from the Oracle [Downloads](#) page.

There are two available installers for the add-in: a "Current User" installer and an "All Users" installer. Use the Current User installer to install the add-in on your local desktop for your own use. The All Users installer is intended for IT administrators.

The add-in runs in Excel on a Windows environment and requires some additional Microsoft components. Check out the [Software Dependencies](#) topic for details.

Installer Types

The Current User installer installs the add-in for the current user's Windows profile only. If there are other people using this computer, they will need to install the add-in for their own Windows profile.

When you use the All Users installer, the add-in is installed in the Programs Files folder and is available for all users on the target Windows machine.

Refer to this table for a full comparison of the two installers:

Comparison	Current User	All Users
File name	vbafe-installer-current-user.msi	vbafe-installer-all-users.msi
Installation Location	Current Windows user profile	Program Files
Target Audience	Business users	IT administrators
Windows Registry Entries	HKEY_CURRENT_USER	HKEY_LOCAL_MACHINE
Elevated Privileges	Not required	Required

Install Using the All Users Installer

To install Oracle Visual Builder Add-in for Excel for all users, download the All Users installer from the Oracle [Downloads](#) page and run the installer.

If any required software is missing, the installation terminates without installing the add-in. Refer to [Software Dependencies](#) for details including information on how to check for and install required components.

You must have elevated privileges for this installation.

The add-in includes designer tools for developing workbooks by default. If the user doesn't need these tools, you can disable them when you install the add-in. If these tools are needed later on, simply rerun the installer and enable them.

This installation is available to all users on the Windows machine. You do not need to install the add-in separately for each user profile.

1. Double-click the `vbafe-installer-all-users.msi` file that you downloaded previously to launch the installation wizard.

If you are not logged in with elevated privileges, you'll be prompted to provide credentials with elevated privileges.

2. To install the add-in without the available developer tools, click **Developer Options** and select **Disabled**.

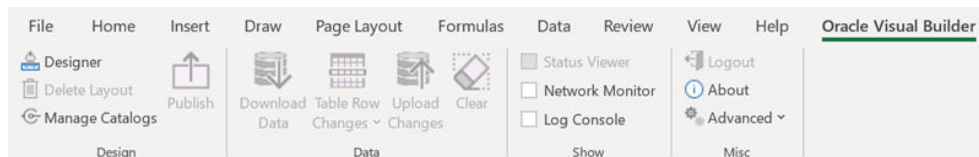
If you need to enable these tools after initial installation, re-run the installer, choose the option to repair your installation, and select **Enabled**.

3. Click **Install** to install the add-in.

When the installation is complete, click **Close**.

4. Start Excel and open a new workbook.

A new Oracle Visual Builder ribbon tab appears, with commands to integrate the Excel spreadsheet with a REST service. If you disabled the design tools during installation, you won't see the Design options in the first pane on the ribbon.



 **Note:**

If you are unable to install the add-in, refer to the installation log. See [Installation Logs](#).

Install Using the Current User Installer

To install Oracle Visual Builder Add-in for Excel for the current user's profile, download the Current User installer (`vbafe-installer-current-user.msi`) from the Oracle [Downloads](#) page and run the installer.

If any required software is missing, the installation terminates without installing the add-in. Refer to [Software Dependencies](#) for details including information on how to check for and install required components.

The add-in includes designer tools for developing workbooks. These tools are included by default. If you are an application developer, make sure to install the designer tools with the add-in. If you need these tools but don't have them, simply rerun the installer and enable the designer tools.

This installation is specific to the current Windows user profile. If multiple users on a Windows machine need the add-in, consider using the All Users installer instead. See [Install Using the All Users Installer](#).

 **Note:**

Running both the All Users installer and the Current User installer on the same machine is not recommended. If you do install the add-in using both installers, Excel loads the add-in installed in the Program Files folder ("All Users") and not the version in the current user's Windows profile ("Current User"). If you decide to switch the installation type, the best practice is to uninstall the previous add-in installation type first to avoid confusion.

To install the add-in:

1. Sign in to the Windows user profile that will be using the add-in with Excel.
2. Quit Excel before you begin installation.
3. Double-click the `vbafe-installer-current-user.msi` file that you downloaded previously to launch the installation wizard.
4. To install the add-in without the available developer tools, click **Developer Options** and select **Disabled**.

 **Tip:**

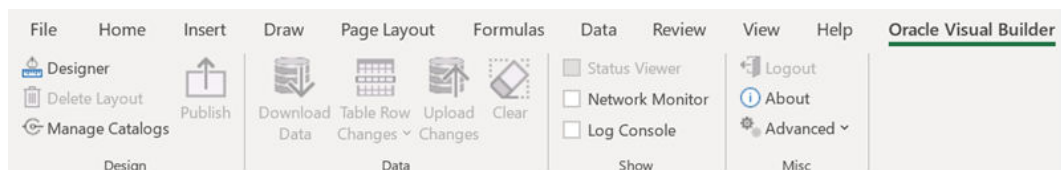
If you need these tools after initial installation, re-run the installer, choose the option to repair your installation, and select **Enabled**.

5. Click **Install** to install the add-in.

When the installation is complete, click **Close**.

6. Start Excel and open a new workbook.

A new Oracle Visual Builder ribbon tab appears with commands to integrate the Excel spreadsheet with a REST service. If you disabled the design tools during installation, you won't see the Design options in the first pane on the ribbon.



When you first run Excel after the current-user installation, you may be prompted to confirm the installation of the "Office customization". This prompt generally appears the first time for each profile and whenever the digital certificate (used to sign the add-in) is changed.

 **Note:**

If you are unable to install the add-in, refer to the installation log. See [Installation Logs](#).

Run the Installer from the Command Line

Since both installers are standard Windows Installer Packages (MSI), you can run `msiexec` on the command line to install Oracle Visual Builder Add-in for Excel.

`msiexec` includes a number of options that let you control or customize your installation. See [Standard Installer Command-Line Options](#) on the Microsoft web site.

Examples

The following example shows a silent installation with logging enabled:

```
msiexec /package vbafe-installer-all-users.msi /quiet /log vbafe-install-log.txt
```

The following example shows a silent uninstall:

```
msiexec /uninstall vbafe-installer-all-users.msi /quiet
```

Unsupported Options

Not all `msiexec` options are relevant or supported for Add-in installation. Unsupported options include `/j` and `/a`.

Enable Designer Tools

The installers define a public property, "DESIGNER", that can be used to enable or disable designer tools during command-line installation. To disable designer tools from the command-line, set `DESIGNER=0`. Refer to the `msiexec` documentation for details on how to set public properties during installation.

When performing an upgrade or repair, the installer uses the previously set value if this property is omitted.

Upgrade to the Latest Version

To take advantage of all the latest Oracle Visual Builder Add-in for Excel features, make sure you are running an up-to-date version of the add-in. To upgrade to a new version, simply download and run the installer.

When a new version is available, the add-in automatically prompts you to upgrade. You can also manually check for a new version from the **Advanced** menu. See [Check for Updates](#).

For recommendations on when you should upgrade, check the [Upgrade Policy](#).

You do not need to uninstall the previous version unless the installer instructs you to do so.

If you want to upgrade from one installation type to the other, uninstall the existing instance of the add-in first.

To determine which type of installation you have, run a diagnostic report and check the "Code Base" property under Properties. If the path is under the current user profile, the add-in was installed using the Current User installer. If the path is under Program Files, the add-in was installed using the All Users installer.

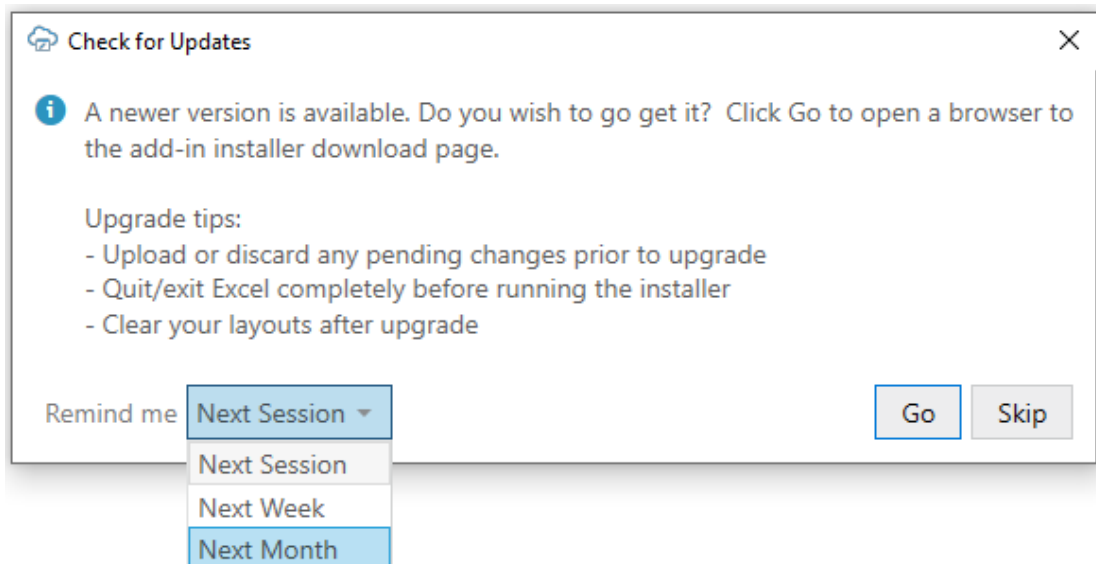
To run the diagnostic report, select **Diagnostic Report** from the **Advanced** menu on the Oracle Visual Builder ribbon.

To ensure a clean upgrade, follow these instructions when upgrading your installation.

1. Before you upgrade the add-in:
 - a. Upload any pending changes using the current add-in version.
 - b. Save changes in open workbooks, then close Excel.
2. Run the installer for the new version and follow the instructions in the wizard. The installer automatically replaces the previous version with the new version.
3. After you upgrade:
 - a. Launch Excel to complete any final installation steps.
 - b. Open your integrated workbook.
 - c. Clear any layouts of old data and download data again as required.

Check for Updates

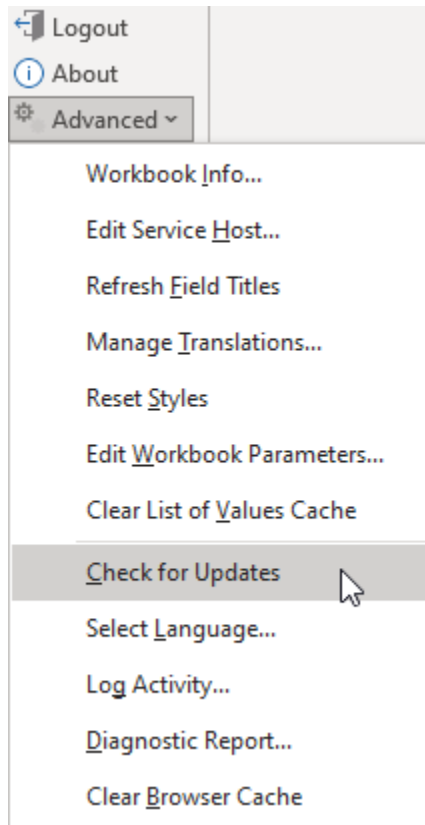
Oracle Visual Builder Add-in for Excel automatically checks for updates once per Excel session when the first integrated workbook is opened. If there is an update available, you are prompted to upgrade. You can also check for a newer version of the add-in using the **Check for Updates** command available from the **Advanced** menu. If there is a newer version, you can get the latest version of the add-in from the [Downloads page](#). If prompted to upgrade, you can choose to get the latest version right away or instead skip the upgrade.



If you choose to skip an upgrade, you'll be reminded again based on the duration you set in the **Remind me** list. If you select "Next Session", you'll be prompted to upgrade when you next launch Excel and open an integrated workbook.

To check for an update manually:

1. From the **Advanced** menu in your existing installation, select **Check for Updates**.



2. If a newer version is available, when prompted to open the downloads page in your browser, click **Go**.
3. Download the installer for the latest version, then install the update. Before you update, be sure to review best practices as described in the previous section.

Security

- The add-in does not send any information about the user or computer to Oracle (or anyone else) during the upgrade check.
- To perform the upgrade check, the add-in fetches this static resource: <https://www.oracle.com/a/ocom/docs/vbafef-info.json>.
- The resource request does include a `User-Agent` header whose value includes the current version of the Excel add-in (as with any request from the add-in).
- Default system credentials may be provided to proxy servers for authentication (as with any request from the add-in).

Upgrade Policy

When a new version of Oracle Visual Builder Add-in for Excel is released publicly, customers should upgrade at their earliest opportunity to take advantage of the latest fixes and improvements.

However, IT departments may need some time to evaluate and deploy a new version to business user desktops. The Oracle upgrade policy allows some flexibility to accommodate this process.

Customers may defer the add-in upgrade by up to six months from the time a new version becomes publicly available. After six months, the old version of the add-in is no longer supported and must be upgraded. So, if the latest version is released on May 15, customers may defer upgrading from the previous version until November 15 at the very latest. After this date, upgrade is mandatory.

Limitations

This upgrade deferral policy is limited in several ways:

- **Fixes for defects:** To obtain a fix for an issue, it is necessary to install a new version of the add-in.
- **Troubleshooting:** When investigating a potential problem, one step in the troubleshooting process is to upgrade to the latest version. Deferral is not an option during the support process.
- **New Workbooks:** Frequently, new versions of the add-in offer new functionality. If your business users have integrated workbooks that leverage new functionality available only in the latest version of the add-in, then add-in upgrade becomes mandatory since the new functionality is not available in the previous version of the add-in.

Uninstall the Oracle Visual Builder Add-in for Excel

Uninstall either version of the add-in (Current-User or All-Users) from the Windows Settings app.

To uninstall the add-in:

1. If you're uninstalling the current user version, sign in to the Windows user profile where the add-in is installed.
2. From the Start Menu, select **Settings**, then **Apps**.
3. From the Apps & Features page, select Oracle Visual Builder Add-in for Excel from the list of programs.

 **Tip:**

Type "Oracle" in the search box to filter on Oracle applications.

4. Click **Uninstall** and follow the instructions.
5. If you have performed a current user installation for multiple Windows user profiles and you want to uninstall them all, repeat these steps for each profile.

Software Dependencies

Oracle Visual Builder Add-in for Excel runs in Excel on a Windows environment and requires some Microsoft components to operate.

Note:

Oracle Visual Builder Add-in for Excel relies on a number of Microsoft technologies. These Microsoft technologies are subject to Microsoft's privacy policies and other Microsoft terms. By installing and using this add-in, you are agreeing to those policies and terms and this add-in's direct or indirect usage of these technologies. See the [Microsoft Privacy Statement](#).

Components	Notes
Microsoft .NET Framework 4.8	The .NET Framework 4.8 is included since the May 2019 update of Windows 10. You can download NET Framework 4.8 here: https://dotnet.microsoft.com/en-us/download/dotnet-framework/net48 .
Microsoft Visual Studio 2010 Tools for Office (VSTO) Runtime	The VSTO Runtime is included with most recent versions of Excel. You can download VSTO Runtime here: https://www.microsoft.com/en-us/download/details.aspx?id=48181 .
Microsoft Edge WebView2	The add-in supports the use of Microsoft Edge WebView2 as an embedded browser for displaying log-in pages. See Embedded Browsers .

The installer checks your system for required software and quits without installing the add-in if any required software is missing.

To install the WebView2 embedded browser, download one of the "evergreen" installers here and run it: [Download Microsoft Edge WebView2](#).

Note:

For information about supported Excel and Windows versions, see [Supported Platforms](#).

Supported Platforms

Oracle Visual Builder Add-in for Excel runs in Excel on Windows. This section provides details on which versions are supported. Review this topic carefully to make sure your configuration is supported.

Microsoft Excel

Refer to this table for supported versions of Excel.

 **Note:**

Oracle recommends the 32-bit version of Excel whenever possible, as the 64-bit editions have been found to be less stable. Refer to the Microsoft article, [64-bit editions of Office 2013](#).

Version	Support Expires
Excel for Microsoft 365 (desktop installation only) *	Refer to Microsoft's Modern Lifecycle Policy .
Excel 2021	2026
Excel 2019	2025
Excel 2016	2025

* Please make sure that your version of Microsoft 365 Apps is still supported. If not, take steps to upgrade to a supported version. See [Update history for Microsoft 365 Apps](#).

The following editions of Excel don't support VSTO/COM add-ins and are, therefore, *not supported*:

- Excel Online
- Excel for Microsoft 365 installed from the Microsoft Store

Microsoft 365 "Beta" and "Preview" update channels provide experimental versions of Excel. Oracle cannot provide support for the add-in when used with software from these channels.

Microsoft Windows

The add-in is supported on Windows 10 and Windows 11.

 **Note:**

Please ensure that your version (or "feature update") of Windows is still in service according to the Microsoft policy. Oracle cannot provide support for versions beyond Microsoft's end of servicing date. See [Windows 10 Lifecycle Policy](#).

The add-in isn't supported on:

- Windows server editions
- MacOS, iOS, Linux, or any other operating system

Virtual Desktop Infrastructure

The Visual Builder Add-in for Excel was designed and tested to work on regular Windows desktop and laptop computers. A number of vendors offer virtual desktop infrastructure (VDI) solutions to provide virtual machines that mimic a standard Windows desktop environment. Some VDI implementations reproduce the standard desktop very closely whereas others are significantly different. Refer to [Desktop Virtualization](#) for an overview of this technology.

Oracle does not test the add-in with VDI products formally. VDI products are not supported on an official basis.

Even though it may be possible to run the add-in on some virtual machines successfully, doing so is strictly at your own risk. If you run into problems, you'll have to reproduce the problem on a standard desktop computer before Oracle Support can assist you. If the problem appears to be a VDI issue, contact your VDI vendor for help.

Microsoft Application Virtualization

Microsoft Application Virtualization (App-V) is not supported in any version at this time.

Notes

- If a software application or version isn't listed here, it is not supported.
- Later versions of Excel and Windows are not automatically supported when they become available. Support can only be added through an enhancement request.
- Oracle doesn't support the add-in on unsupported software. If a vendor drops support for a given software version, Oracle support ends at the same time. This is true even if the software is listed here.
- Microsoft may not support all possible combinations of their software and operating systems listed here. If Microsoft doesn't support a given combination, Oracle doesn't either. If you're unsure if your versions of Excel and Windows are compatible, consult your software or operating system documentation.
- Support expiration dates for Windows and Excel are determined by Microsoft support policies. See [Microsoft Lifecycle Policy](#).

4

Create Layouts in an Excel Workbook

To integrate a workbook with a REST service, create a layout for a business object on a new worksheet. You can then download data for the business object to the layout and start working with it.

Layouts

Oracle Visual Builder Add-in for Excel lets you create different layouts to work with data in an Excel worksheet. Layouts are a way to display a business object in an Excel worksheet. Each worksheet supports one of two layouts: **Table** or **Form-over-Table**.

- Use a Table layout to view and edit data from a REST service in a tabular format. Here's a worksheet showing employee data in a Table layout:

	A	B	C	D	E	F	G	H	I	J	K	L
1	Change	Status	First Name	Last Name*	Email*	Hire Date	Job Title	Salary	Manager Id	Department*	Id*	Key
2			Sophie	Ren	sphren@example.com	2012-02-09	Manager	65,435.00	101	Research	2
3			Dave	Brown	davbro@example.com	2017-07-04	Manager	28,000.00	102	Accounting	3
4			Julia	Nayer	jnayer@example.com	2005-07-16	Member Technical Staff	3,200.00	120	Accounting	6
5			Steven	King	sking@example.com	2003-06-17	Member Technical Staff	24,000.00	100	Accounting	7

- Use a Form-over-Table layout when a parent-child relationship exists in the business objects used by your web application. Here's a worksheet showing purchase order and line data in a Form-over-Table Layout, where the parent object's data (Purchase Orders) is shown in the form and the child object's data (Lines) is shown in the table:

	A	B	C	D	E
1	Purchase Orders				
2	Order	1004976	Status	Open	
3	Description		Document Style	Purchase Order	
4	Procurement BU	Vision Operations	Requisitioning BU	Vision Operations	
5	Buyer	Furey,Clare	Purchase Order Email Sender		
6	Currency	US Dollar	Supplier	CV_SuppA00	
7	Supplier Site	CVSuppA00Site01	Shipping Method	Airborne	
8	Pay on Receipt	TRUE			
9					
10					
11	Change	Status	Line	Line Type	Item
12			1.00	Goods	zPOR-SCH005_Dell_Inspiron_1525

You can create one layout per worksheet in your Excel workbook. Layouts are created by workbook developers and are visible to data entry users in their workbooks.

Service Descriptions

To create a layout in the workbook, the REST services that you use must provide a service description that complies with the OpenAPI specification. The service description can be a URL or a local file. For Oracle business object REST API services, the URL typically includes a describe path segment, as in `https://my-service-host/fscmRestApi/resources/latest/invoices/describe`. For Oracle REST Data Services (ORDS), the URL may be similar to `https://host/ords/great_app/open-api-catalog/employees/`.

You can provide the service description document when you create a layout by clicking **Designer** in the Oracle Visual Builder tab, as described in subsequent sections. You can also provide the service description document by clicking **Manage Catalogs** in the Oracle Visual Builder tab (see [Manage Catalogs and Business Objects](#)).

The service description that you provide helps generate a **business object catalog** for the workbook. A business object catalog is essentially a list of business objects. As a workbook developer, you can edit portions of the business catalog as desired, or use it as is to create layouts.

Create a Table Layout in an Excel Workbook

Create a Table layout in the Excel worksheet when you want to view and edit data from a REST service in a tabular format.

When you create a Table layout, you'll be prompted to point to the service description document. The service description document can be stored on your local drive or accessed remotely using a URL.

Before you continue, review the relevant service support topic for your service:

- [Oracle Business Object REST API Services](#)
- [Oracle REST Data Services](#)
- [NetSuite SuiteTalk REST Web Services](#)

You'll also have the option to provide authentication details for accessing your REST service. Consult with your REST service owner for access requirements.

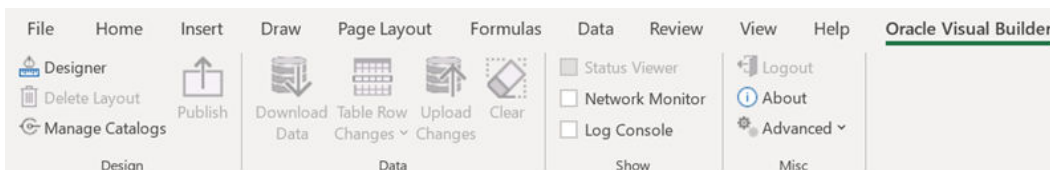


Note:

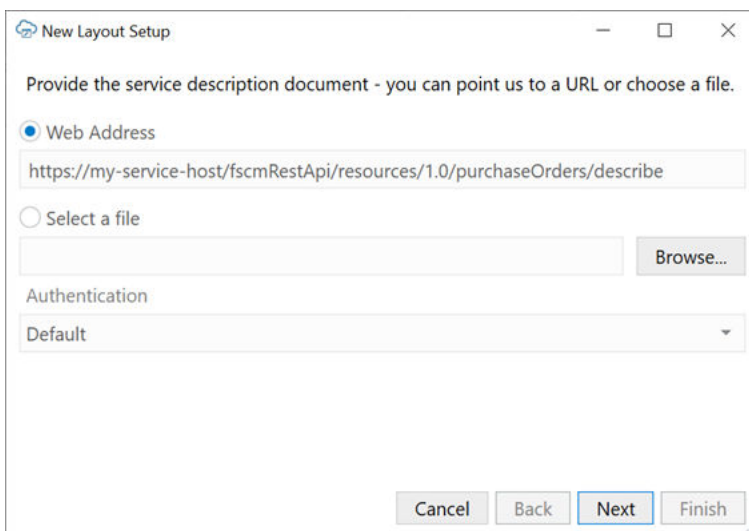
You can create a layout that references polymorphic business objects and includes descriptive flexfields. See [Use Polymorphic Business Objects and Fields](#).

To create a Table layout:

1. Create a blank Excel workbook using the standard `.XLSX` file format or the macro-enabled `.XLSM` format. Other Excel formats (`.XLS` and so on) are not supported.
2. Click the cell where you want to locate the data table.
3. Open the **Oracle Visual Builder** tab from the Excel ribbon.



- Click **Designer** to launch the **New Layout Setup** wizard.



- From the first screen, provide the service description document using one of these options:
 - Web Address** option (the default) if you access the service description from a URL. Note that you can't provide a data URL (a URL that returns data) as the starting point to creating a layout.
 - Select a file** option if the service description document is a local file on your computer.

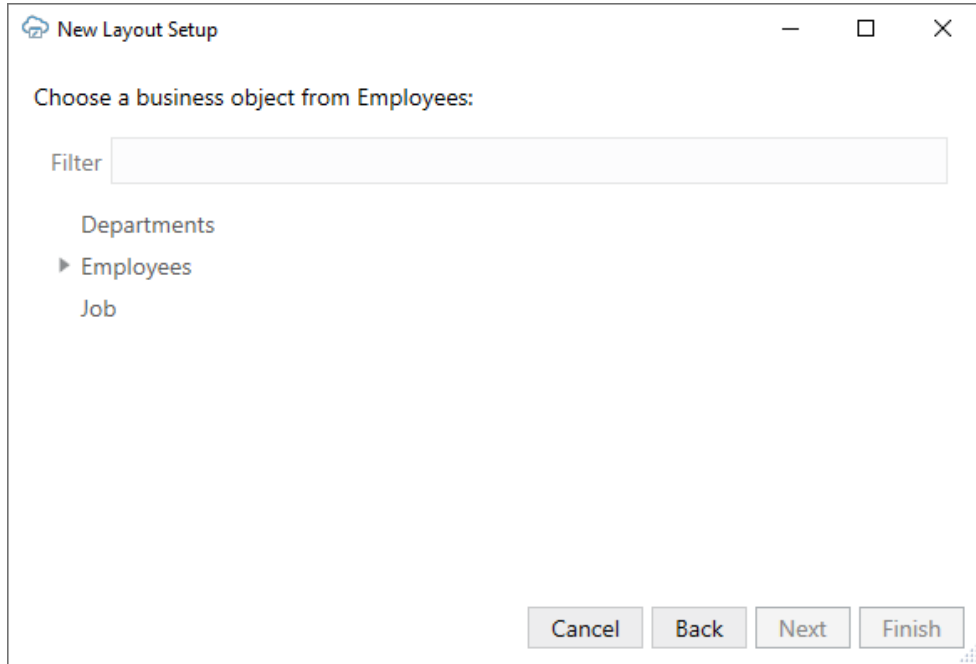
If you are working with Oracle business object REST API services, the URL for the service description usually ends with `/describe`, for example, `https://my-service-host/fscmRestApi/resources/<version>/purchaseOrders/describe`.

- Select the authentication method for your service from the **Authentication** list and click **Next**.
See [Authentication Options](#) for more information.
- If you selected OAuth 2.0 Authorization Code, enter the required properties and click **Next**.
Required fields are outlined in red. Refer to [OAuth 2.0 Authorization Code Flow](#) for descriptions of the fields.
- If the service includes five or more business objects, select the business objects you want to include in the catalog, then click **Next**.
The wizard displays details of the newly-created catalog, such as the catalog name, service host and basepath, and number of business objects.
- Review the new catalog details.

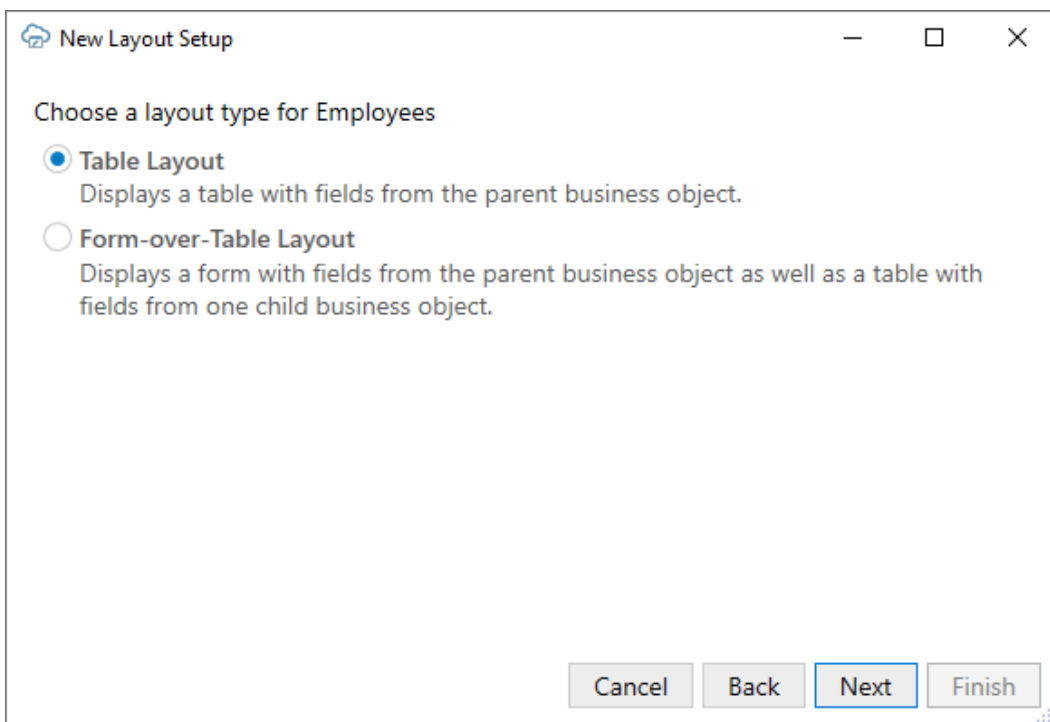
 **Note:**

If there are any errors in the service description document, click **Save Report** to save the report to your local drive. Share this report with the service owner.

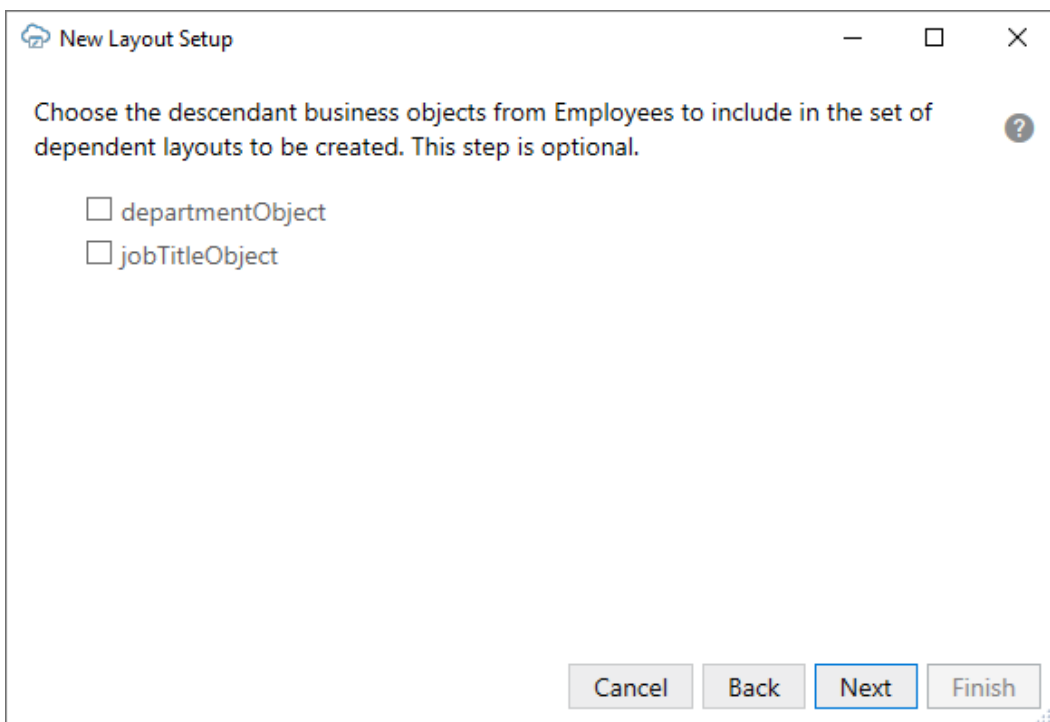
10. Click **Next** to proceed.
11. Select a business object and click **Next**.



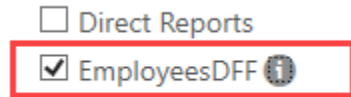
12. Select **Table Layout** and click **Next**.



The next screen prompts you to select child business objects if you are creating a set of dependent layouts. See [Create a Set of Dependent Layouts](#).

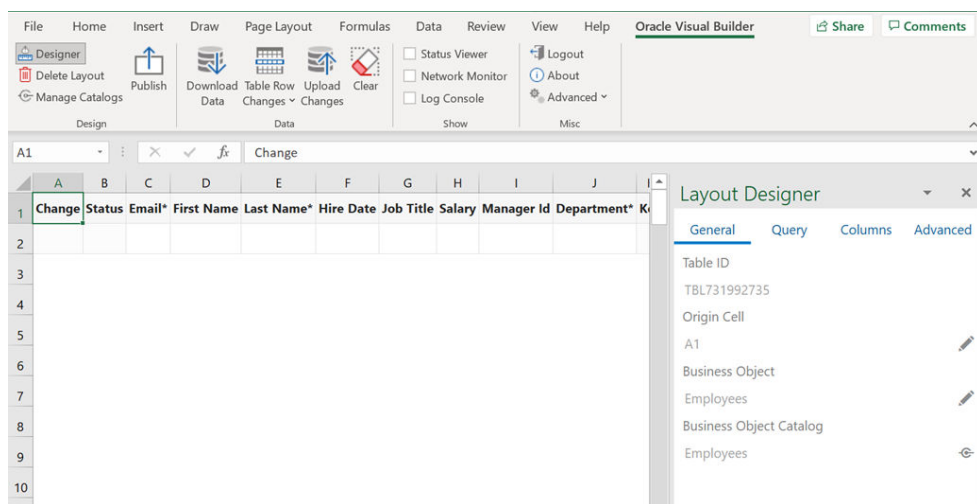


If there are any available descriptive flexfields, these are displayed in the list and are indicated by the Information icon (i).



If you select this business object, the descriptive flexfields are added as fields to the respective parent layout. See [Create a Layout Using Descriptive Flexfields](#).

13. For a standalone Table layout, click **Next** without selecting any child business objects.
14. Review the Table layout details and then click **Finish**.
The add-in creates a Table layout in the Excel workbook that includes column headers and a placeholder data row. The Layout Designer opens in the Excel Task Pane.



Note:

If the origin cell of the layout is in the first 10 rows, the header row is frozen so that you always see the column headers when you scroll up and down in the worksheet. If desired, you can unfreeze the header row from Excel's **View** tab.

Before you proceed to publishing your workbook, you may want to configure the workbook in various ways to make it easier for your business users to use. For example, you might consider:

- Configuring the workbook to limit the data that the add-in downloads. See [Configure Search Options for Download](#).
- Adding, removing, or reordering columns in your layout. See [Manage Fields in a Form or Table](#).
- Modifying a field associated with a column to, for example, show help text or display a list of input values for your business users. See [Configure Business Object Fields](#) and [Configure a List of Values with a Business Object](#).

Before you publish, it's a good idea to perform various data operations, such as download, update, and upload, to test the workbook before you distribute it to users.

For information on managing data, see View and Edit Data Using an Excel Workbook in *Managing Data Using Oracle Visual Builder Add-in for Excel*.

Work with Service Path Parameters in a Table Layout

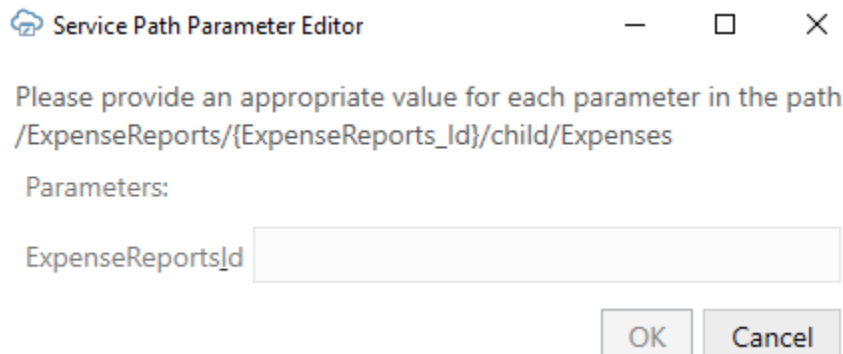
Some service paths include path parameters. The add-in provides support for configuring a Table layout using a parameterized service path. It automatically extracts the path parameters and prompts the user to provide the corresponding values at download time.

To configure a Table layout with a parameterized service path, first provide an OpenAPI-compliant service description. When prompted, choose a child business object or any parameterized path from the business object picker.

Tip:

When working with Oracle business object REST API services, you should start with the web address to the parent business object description (and not the child address). For example, for a parameterized service path such as `/ExpenseReports/{ExpenseReports_Id}/child/Expenses/`, provide the address to the `ExpenseReports` description (not `Expenses`). Oracle business object REST API services cannot provide OpenAPI service descriptions for parameterized service paths.

Complete the layout configuration. When users click **Download Data** in the Oracle Visual Builder tab, the add-in displays the Service Path Parameter Editor where users provide the required path parameter values that enables the download of data to complete.



Service Path Parameter Editor

Please provide an appropriate value for each parameter in the path
`/ExpenseReports/{ExpenseReports_Id}/child/Expenses`

Parameters:

ExpenseReportsId

OK Cancel

Path parameters of type string or integer are supported; other data types are not supported. For string-typed path parameters, values that users enter in the Service Path Parameter Editor are used verbatim when the add-in constructs the request to the service. For integer-typed values, certain culture-specific formatting is removed (for example, commas for thousands separators, parentheses for negative). In all cases, the values used on the URL path are not URL-encoded, so the values entered must be acceptable by the REST service.

Here is an example of a service path with an embedded parameter:

```
/ExpenseReports/{ExpenseReports_Id}/child/Expenses/
```

Note `{ExpenseReports_Id}` is in the middle of the service path.

Using the Service Path Parameter Editor, you provide the proper value for `{ExpenseReports_Id}`, for example, `123456`, which results in the add-in using the following path:

```
/ExpenseReports/123456/child/Expenses/
```

Accessing this service path will provide all the expenses for expense report `123456`.

The Service Path Parameter Editor does not validate the value(s) that users enter. The value(s) that users provide must be valid. If the path includes multiple embedded parameters, the Service Path Parameter Editor prompts the user to provide a value for each embedded parameter.

The add-in remembers the values provided at download time. These values are used again at upload time to construct the upload requests. If you upload without having done a previous download (for example, when exclusively creating new rows), you'll be prompted for the path parameter values at the beginning of the upload.

 **Note:**

Since business users may not know the path parameter values at download time, consider using a Form-over-Table layout or a set of dependent layouts instead. See [Create a Form-over-Table Layout in an Excel Workbook](#) or [Use Multiple Layouts for Multi-level Business Objects](#).

Create a Form-over-Table Layout in an Excel Workbook

You can create a Form-over-Table layout in an Excel worksheet when a parent-child relationship exists in the chosen service.

A Form-over-Table layout can only be created for the top-level business object in a business object hierarchy. Suppose you have a hierarchy with three levels: `purchaseOrders`, `lines`, and `schedules`. In this hierarchy, `purchaseOrders` is a collection of top-level purchase orders each with one or more lines for managing the details of each order. Each of these lines may include one or more schedules for tracking shipping details.

In this scenario, you can only create a Form-over-Table layout for the `purchaseOrders` and `lines` business objects. You can't use `lines` for the form and `schedules` for the table in a Form-over-Table layout. See [Use Multiple Layouts for Multi-level Business Objects](#).

 **Note:**

You can create a layout that references polymorphic business objects and includes descriptive flexfields. If the business object includes descriptive flexfields, they are appended with "DFF" (for example, "EmployeesDFF") and included in the list of descendant business objects. See [Use Polymorphic Business Objects and Fields](#).

A parent-child relationship at the service level requires:

- A parent service path, for example, `fscmRestApi/resources/1.0/purchaseOrders`
- A child service path with a parameter, for example, `fscmRestApi/resources/1.0/purchaseOrders/{purchaseOrder-id}/child/lines`

In your workbook, both business objects must be declared in the same catalog. Continuing our example, `lines` must appear as a child of `purchaseOrders`. To allow for data retrieval, updates, creation, deletion, and action invocation with the parent and child business objects using this layout, the service must expose the corresponding GET, PUT/PATCH, POST, and DELETE operations on these paths.

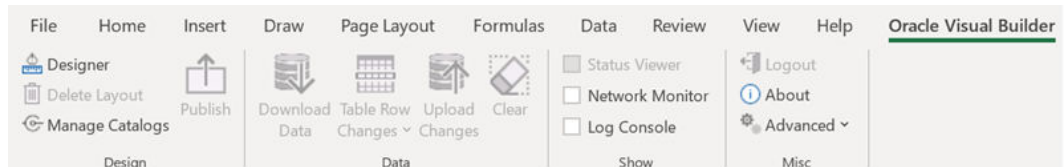
When you create a Form-over-Table layout, you may be prompted to point to the service description document. The service description document can be stored on your local drive or accessed remotely using a URL.

You'll also have the option to provide authentication details for accessing your REST service. Consult with your REST service owner for access requirements.

For information on Oracle REST Data Services (ORDS) requirements when creating Form-over-Table layouts, see the notes on ORDS support in [Requirements for Dependent Layouts](#).

To create a Form-over-Table layout:

1. Create a blank Excel workbook using the standard `.XLSX` file format or the macro-enabled `.XLSM` format. Other Excel formats (`.XLS` and so on) are not supported.
2. Click the cell where you want to locate the form and table.
3. Open the **Oracle Visual Builder** tab from the Excel ribbon.



4. Click **Designer** to launch the **New Layout Setup** wizard.

5. From the first screen, provide the service description document using one of these options:
 - **Web Address** option (the default) if you access the service description from a URL. Note that you can't provide a data URL (a URL that returns data) as the starting point to creating a layout.
 - **Select a file** option if the service description document is a local file on your computer.

 **Tip:**

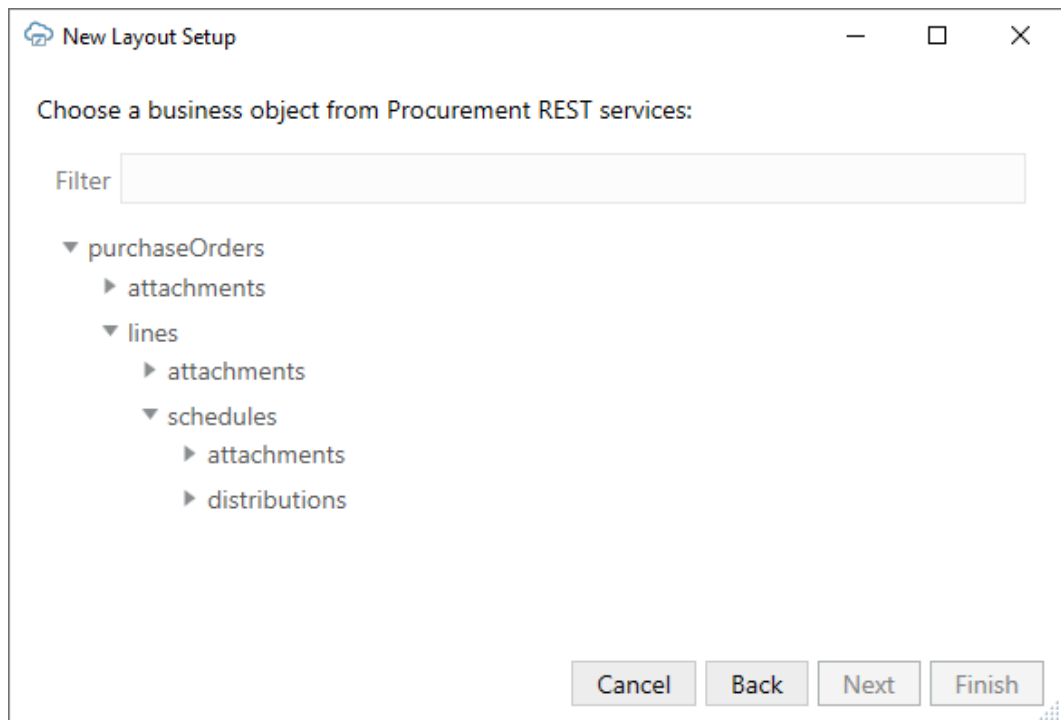
If you are working with Oracle business object REST API services, the URL for the service description usually ends with `/describe`, for example, `https://my-service-host/fscmRestApi/resources/1.0/purchaseOrders/describe`.

6. Select the authentication method for your service from the **Authentication** list and click **Next**.
See [Authentication Options](#) for more information.
7. If you selected OAuth 2.0 Authorization Code, enter the required properties and click **Next**.
Required fields are outlined in red. Refer to [OAuth 2.0 Authorization Code Flow](#) for descriptions of the fields.
8. If the service includes five or more business objects, select the business objects you want to include in the catalog, then click **Next**.
The wizard displays details of the newly-created catalog, such as the catalog name, service host and basepath, and number of business objects.
9. Review the new catalog details.

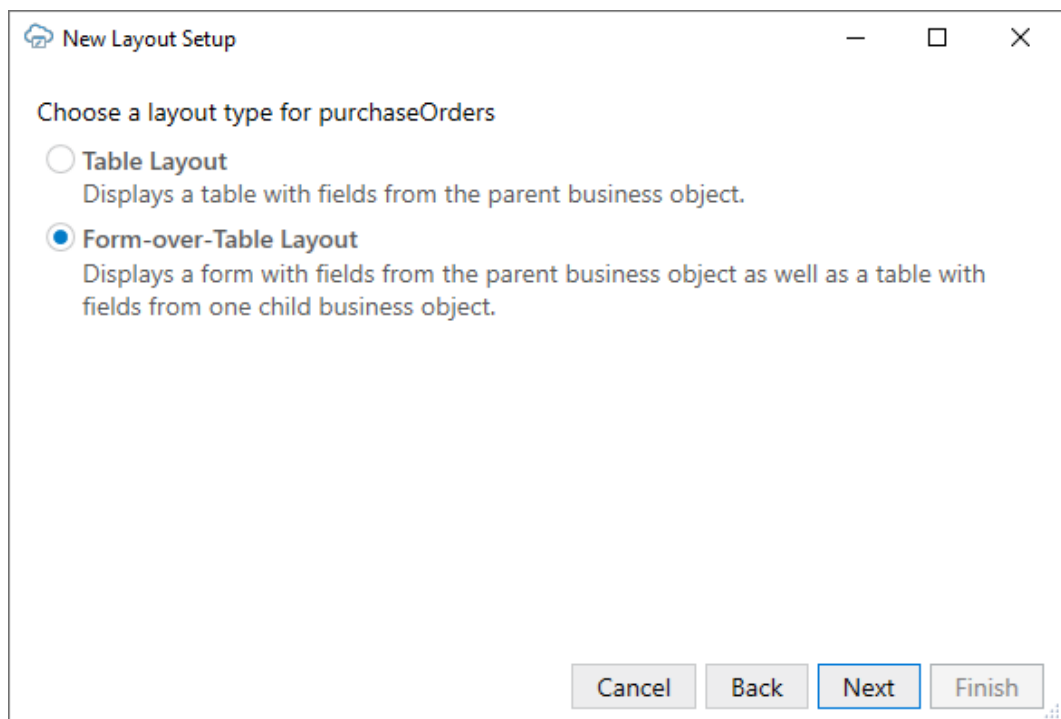
 **Note:**

If there are any errors in the service description document, click **Save Report** to save the report to your local drive. Share this report with the service owner.

10. Click **Next** to proceed.
11. Choose the top-level business object for the form (in this case, `purchaseOrders`), and click **Next**.

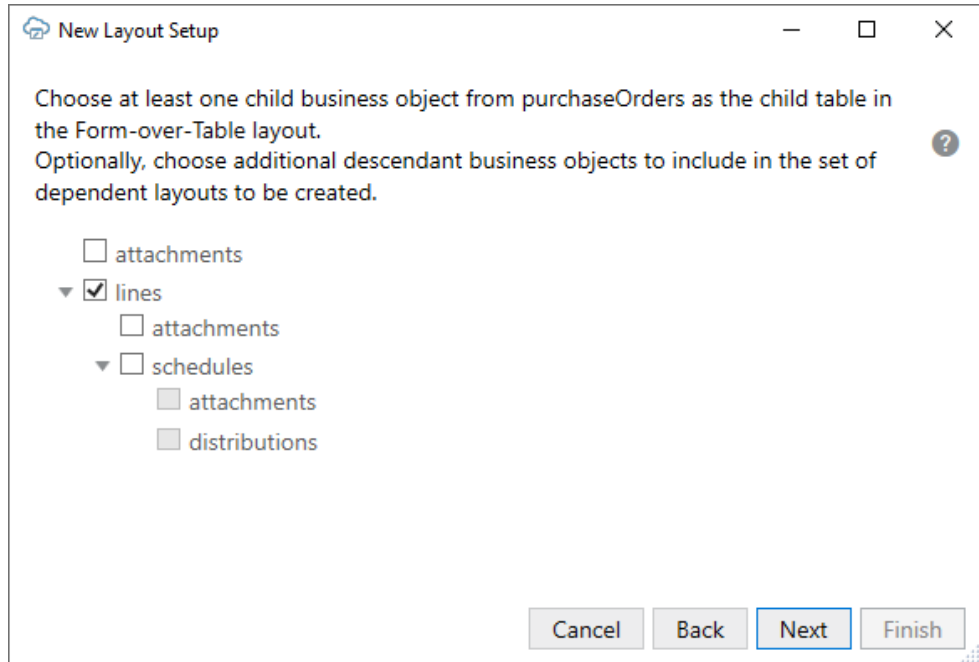


12. Choose **Form-over-Table Layout**, and click **Next**.

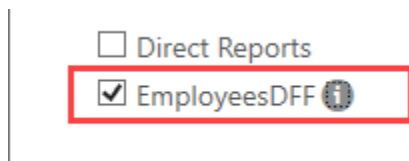


The Form-over-Table layout option is unavailable if you didn't select the top-level business object or there is no available child business object.

13. Choose a child business object for the table part of your Form-over-Table layout (in this case, `lines`), and click **Next**.



If there are any available descriptive flexfields, these are displayed in the list and display a "DFF" ending.

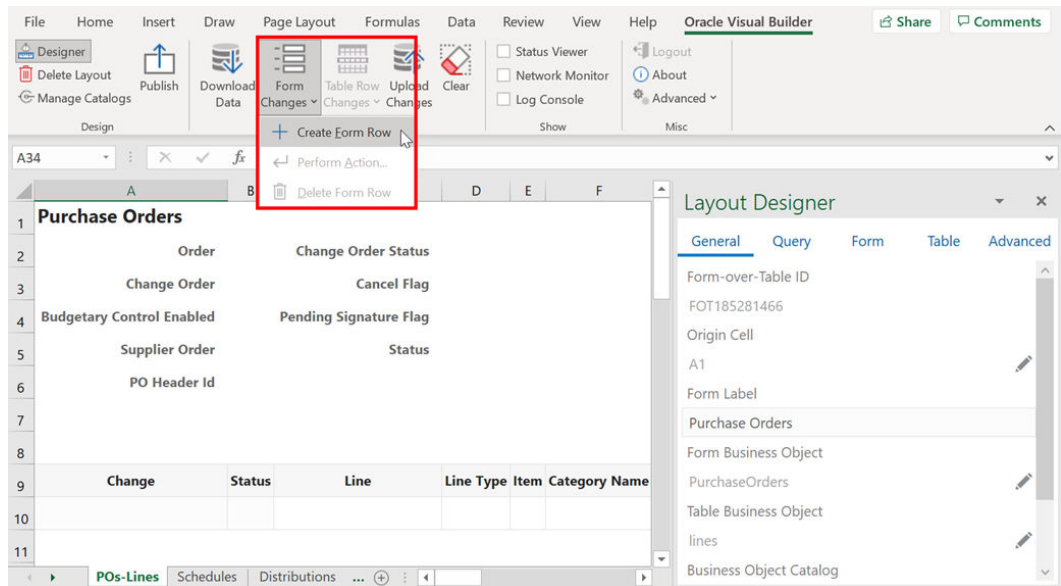


If you select this business object, the descriptive flexfields are added as fields to the parent layout. See [Create a Layout Using Descriptive Flexfields](#).

 **Note:**

You can select additional child business objects if you want to create a set of dependent layouts. If you select more than one, you'll be prompted to select the business object you want to show in the table of the root layout. See [Create a Set of Dependent Layouts](#).

14. Confirm the details of your Form-over-Table layout, and click **Finish**. The add-in creates a Form-over-Table in the Excel worksheet and opens the Layout Designer that you use to modify the newly-inserted form and table, as shown here:



If the form business object (in this case, `purchaseOrders`) supports a create action, a **Create Form Row** option appears in the Form Changes menu, as shown in the image. Use this option to create a new form row during your next upload (see *Create a Parent Row in a Form-over-Table Layout in Managing Data Using Oracle Visual Builder Add-in for Excel*).

Before you proceed to publishing your workbook, you may want to configure the workbook in various ways to make it easier for your business users to use. For example, you might consider:

- Configuring a search for the workbook to allow your business users to specify an item for the form, as described in [Configure Search Options for Download](#). If you do not specify a value for the Search field or Row Finder property, the add-in downloads the first parent item it encounters in the REST service to the form, and the child items, if any, to the table.
- Adding, removing, or reordering form fields or columns in your layout. See [Manage Fields in a Form or Table](#).
- Modifying a field associated with a column to, for example, show help text or display a list of input values for your business users. See [Configure Business Object Fields](#) and [Configure a List of Values with a Business Object](#).

Before you publish, it's a good idea to test the workbook before you publish and distribute it to users. For information on managing data in a Form-over-Table layout, see *Manage Data in Form-over-Table Layouts in Managing Data Using Oracle Visual Builder Add-in for Excel*.

Manage Fields in a Form or Table

When you create a layout, Oracle Visual Builder Add-in for Excel adds most but not all fields to your form or table. If desired, you can add or remove fields or change the order they appear in the layout.

Besides adding business object and custom payload fields to a layout, you can also add fields from a parent or higher business object to a layout in a set of dependent layouts. These fields are referred to as "ancestor" fields. For example, you might want to add an ancestor

column to a layout to help your business users track which child items are associated with which higher-level items. See [Use Multiple Layouts for Multi-level Business Objects](#).

If there are any descriptive flexfields (DFFs) available your layout, these are also included in the list of available fields. For more information about DFFs, see [Add Descriptive Flexfields to a Layout](#).

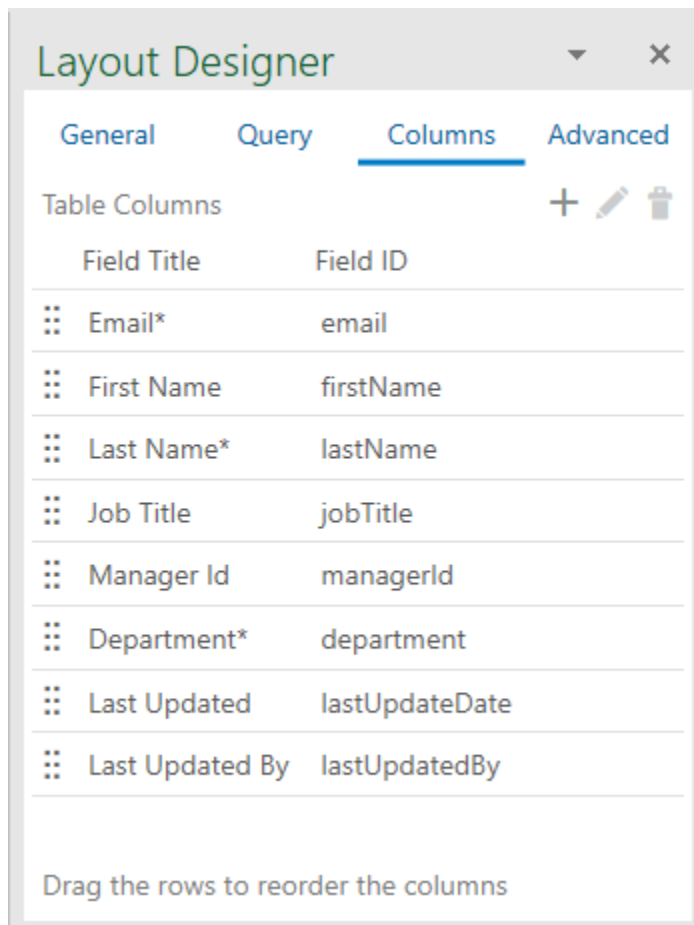
This task shows you how to add, remove, and reorder columns in a Table layout but the steps are the same for form fields and table columns in a Form-over-Table layout.

To manage the columns in a Table layout:

1. Select the layout, then click **Designer** from the Oracle Visual Builder tab to open the Layout Designer.
2. For a Table layout, click the **Columns** tab in the Layout Designer.

For a Form-over-Table layout, click either the **Form** or **Table** tab.

The tab displays the table columns in the order they appear in the layout.



3. Perform one or more of these actions as required:
 - To change the order of the columns, drag a column to another location in the list.

 **Tip:**

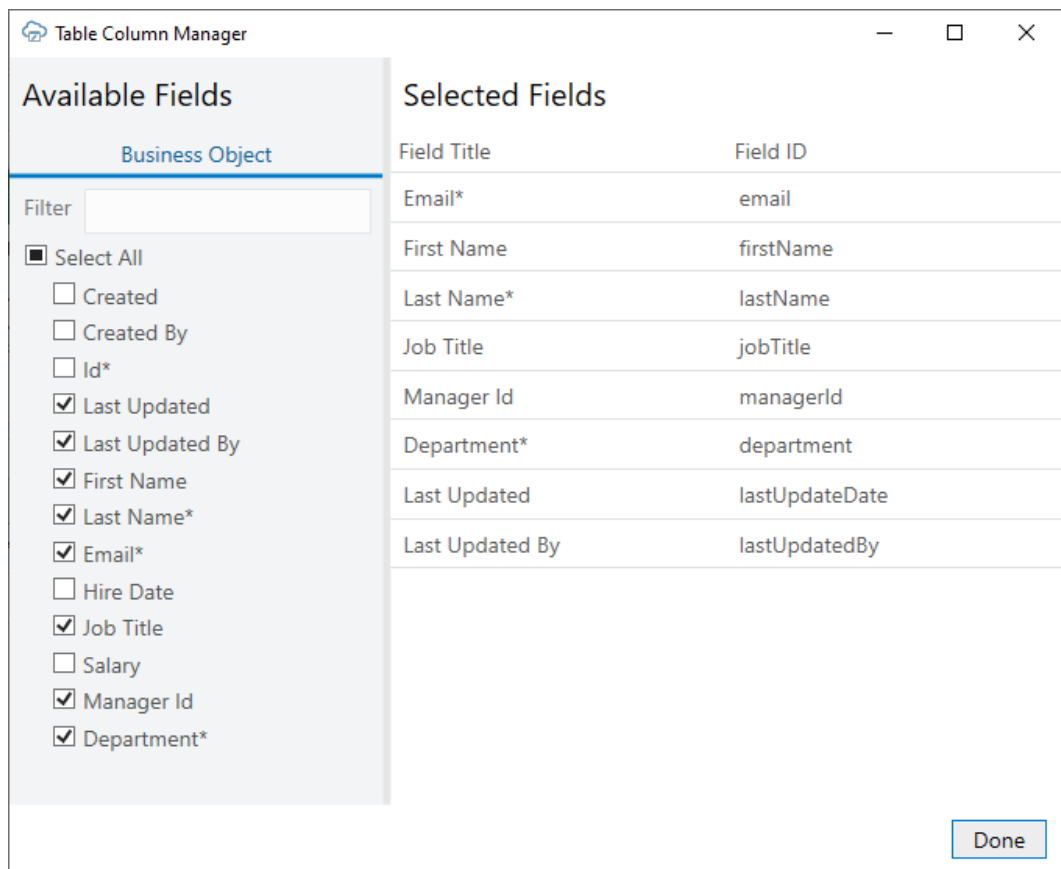
You can also right-click a column and select an action (Move Up, Move Down, and so on) from the popup menu.

- To delete a column, select a column and then click the Delete icon (🗑️).

 **Tip:**

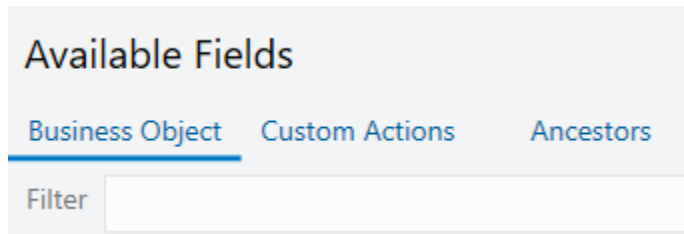
You can use the Shift and Ctrl keys to select multiple columns for deletion.

- To edit the field, double-click the column in the list to open the Business Object Field Editor.
4. If you want to add columns to your layout, click Manage Columns (+) to open the **Table Column Manager**.



Field Title	Field ID
Email*	email
First Name	firstName
Last Name*	lastName
Job Title	jobTitle
Manager Id	managerId
Department*	department
Last Updated	lastUpdateDate
Last Updated By	lastUpdatedBy

If the business object supports custom actions or is a child object in a hierarchy of business objects, you'll see additional tabs (such as **Custom Actions** and **Ancestors**) in the **Available Fields** pane.



5. Click the appropriate tab for the type of field you want to add from the **Available Fields** pane.
Available ancestor columns are grouped by business object. So ancestor columns available for a grandchild layout are grouped by parent and child.
6. In the **Selected Fields** pane, select the location where you want the columns to be added.

7. Select the columns you want to add from the **Available Fields** pane.

The columns are inserted before the selected field.

In this example, you may want to add **Hire Date** and **Salary** to the table before **Manager Id**. To do this, select **Manager Id** in the **Selected Fields** pane, then select the **Hire Date** and **Salary** check boxes in the **Available Fields** pane.

 **Note:**

If you are adding a column that is referenced by a list of values in another column, make sure the added column is positioned before the field with the list of values. See [Configure a Filter with a Dynamic Parameter](#) for more information.

8. You can also perform one or more of these actions if required:
 - To add or remove all columns, select or deselect **Select All**.
 - To remove a column, deselect the column's check box.
 - To change the order in the layout, drag a column in the **Selected Fields** pane to another location in the list.

 **Tip:**

You can also move a column by right-clicking it, then selecting an action (Move Up, Move Down, and so on) from the popup menu.

- To edit the field, double-click the column in the **Selected Fields** pane to open the Business Object Field Editor.
9. When you have made all your changes, click **Done**.

Create Layouts for Attachment Business Objects

Create a Table layout using an attachment business object that lets your business users upload and download attachments.

You can create a standalone Table layout, the Table layout of a Form-over-Table layout, or a Table layout in a set of dependent layouts based on an attachment business object. You cannot use the form in a Form-over-Table layout.

Service Requirements

Oracle Visual Builder Add-in for Excel supports attachments in integrated workbooks if the REST service has:

- An Attachment Record Business Object that contains the metadata for attachments, such as the attachment type, file name, and file size.
- The following fields in the Attachment Record Business Object:
 - **Type:** A string field representing the attachment type. Valid values for this field are `TEXT`, `FILE`, and `WEB_PAGE`. These values are case-sensitive.
 - **File Name:** A string field representing the attachment file name. This field is used by text and file type attachments.
 - **Url:** A string field representing the attachment URL. This field is used by web page type attachments.
- An Attachment Data Business Object that is a child of the attachment record business object and allows for the sending and receiving of attachments

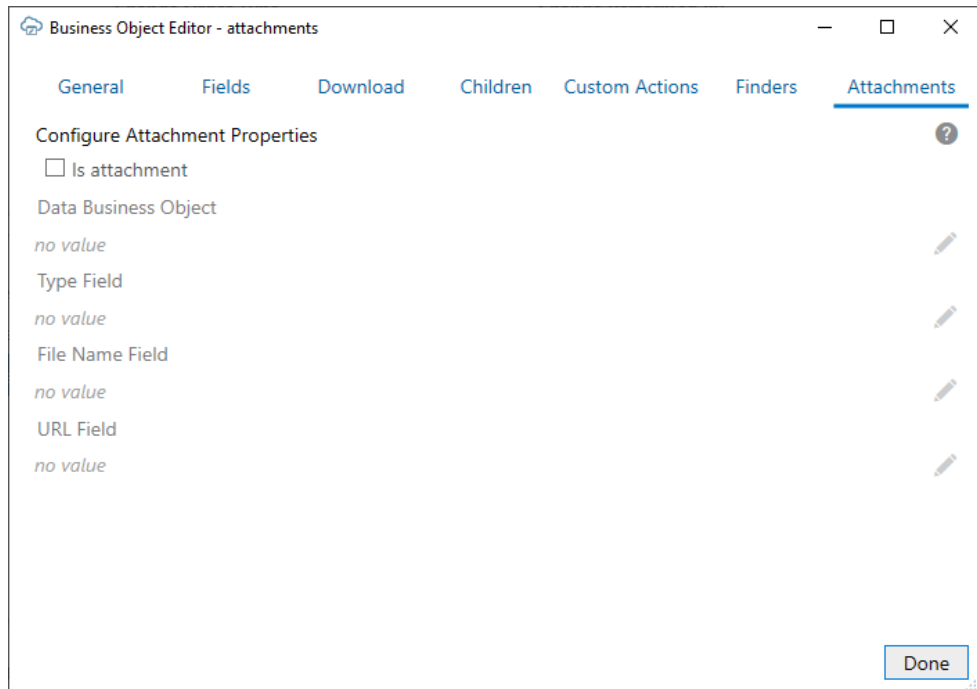
When you create a Table layout based on an attachment business object, the add-in can properly configure the layout as long as the attachment record business object includes:

- An Attachment Data Business Object as a child business object with a path ending in `/enclosure/FileContents`; and,
- Fields with field Ids of `DatatypeCode` (for the Type field), `FileName` (File Name), and `Url` (Url).

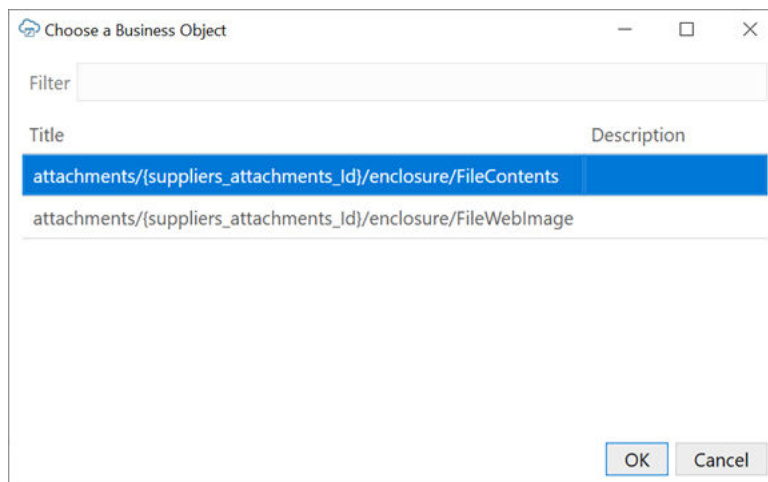
Configure an Attachment

If the workbook was created before version 2.8 of the add-in or the naming does not match, configure the attachment record business object manually from the Business Object Editor.

1. Open the Business Object Editor for an attachment business object and click the **Attachments** tab.



2. Select **Is attachment**.
3. Click the **Edit** icon (✎) next to **Data Business Object** to open the **Choose a Business Object** dialog. The dialog displays the paths for all child business objects for the Attachment Record Business Object.
4. Select the required child Attachment Data Business Object from the list, then click **OK**.

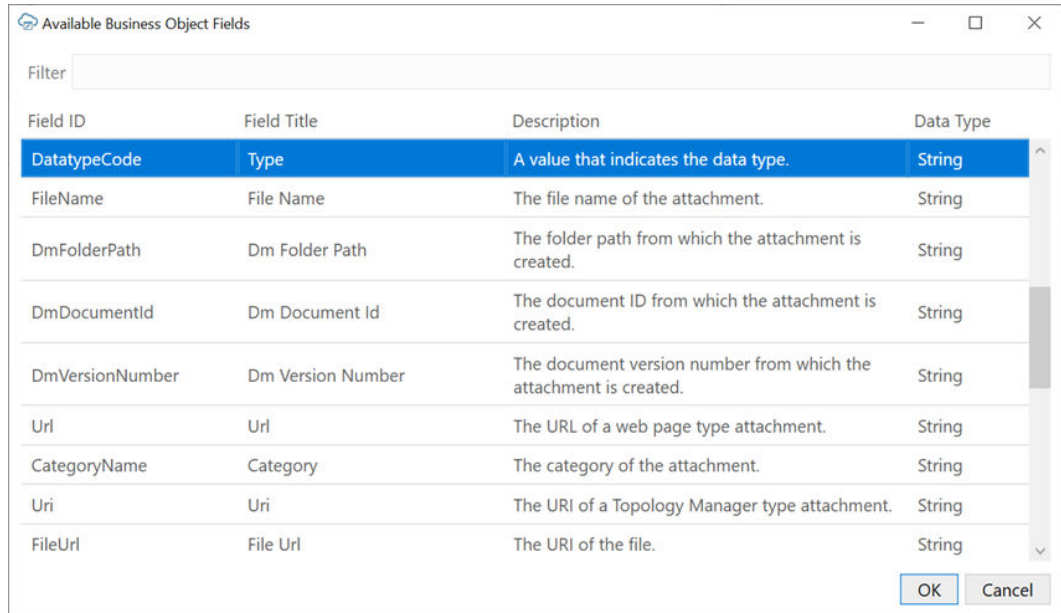


The child business object must support sending and receiving attachment data. This means that the child endpoint has a collection path that supports:

- GET to retrieve attachment data
- PUT to send attachment data
- Request content type of `application/octet-stream`

The path may be similar to this: `{parent attachment record item path}/enclosure/FileContents`.

- Click the **Edit** icon (✎) next to **Type Field** to open the **Available Business Object Fields** dialog.
- Select the field to represent the attachment type, then click **OK**.



This field must be a string field with valid values of `TEXT` (text type attachment), `FILE` (file type attachment), and `WEB_PAGE` (web url-based attachment). Typically, the field ID for this field is `DatatypeCode`.

- Use the available **Edit** icons to set the **File Name** and **URL** fields.

Field	Description
File Name Field	A string field representing the attachment file name. This field is used for text and file type attachments. Typically the field ID for this field is <code>FileName</code> .
URL Field	A string field representing the attachment URL. This field is used by web page type attachments. Typically the field ID for this field is <code>Url</code> .

- When finished, close the open editors using the **Done** buttons.



If properly configured, the resulting Table layout includes a **Local File Path** column that keeps track of the location of local copies of attachments. Selecting cells in the table opens an attachment pop-up that can be used to interact with attachments. See *Manage Attachments* in *Managing Data Using Oracle Visual Builder Add-in for Excel*.

B	C	D	E	F	G	H	I
Status	Type	File Name	Url	Title	Description	Local File Path	Key
	TEXT	attachment.txt		Text attachment	Text attachment		
	WEB_PAGE		https://link/to/document.html	Web page attachment	Web page attachment		
	FILE	receipt.pdf		PDF attachment	PDF receipt attachment		

Attachment

Type Text

File name attachment.txt

Local file  

Known Limitations

- See **Service Requirements** in this topic for the limitations on services that support this feature.
- Binding an attachment record business object to the form portion of a Form-over-Table layout is not supported.
- The only supported attachment types are file, text, and web page. The specific supported values for the field are `TEXT`, `FILE`, and `WEB_PAGE`. These values are case sensitive. Unknown attachment types are treated as file type attachments.
- File download is not asynchronous and may make the UI appear frozen for large attachment files.
- It is not possible to change the position of the Local File Path column in the table. It always appears at the end of the table before the Key column.
- Manually editing the file path in the Local File Path column is not supported. The attachment pop-up should always be used to specify the local file location.
- For some services, create may fail for text-based attachments. Ensuring all required attachment metadata, such as the `Title`, is present and resubmitting the record generally resolves this issue.
- Attachment metadata records may have additional fields, such as `DmDocumentId`, `UploadedFileContentType`, that should generally be managed by the service and not altered by the business user. It is recommended that you mark these fields as read-only in the Business Object Editor if they aren't already or omit them from the Table layout.

Use Polymorphic Business Objects and Fields

Oracle Visual Builder Add-in for Excel supports using polymorphic business objects in Table and Form-over-Table layouts you create for an integrated workbook. Where and how a polymorphic business object can be used in a layout depends on its relationship with other business objects in the service.

If a polymorphic business object is a top-level business object or is a child business object with a "one-to-many" relationship with its parent, it can be used directly in a layout.

In this case, you create a layout for polymorphic business objects as you do for any other business objects. See [Create a Table Layout in an Excel Workbook](#) and [Create a Form-over-Table Layout in an Excel Workbook](#).

If a child polymorphic business is in a "one-to-one" relationship with its parent, descriptive flexfields from the child can be added as fields to a layout bound to its parent business object during layout creation. See [Create a Layout Using Descriptive Flexfields](#).

You can also add descriptive flexfields to an existing layout as described in [Add Descriptive Flexfields to a Layout](#).

To determine the relationship of a child business object to its parent, see [Check the Cardinality of Child Polymorphic Business Objects](#).

About Polymorphic Business Objects

A polymorphic business object is a business object where the set of fields for a particular record differs based on the value of a **discriminator** field (also known as a **context segment**). In addition, a polymorphic business object includes a number of fields representing global or context-sensitive segments. Global segments are available for all values of the discriminator field, while context-sensitive segments are dynamic based on the value of the discriminator field. Descriptive flexfields (DFFs) are a type of polymorphic business object.

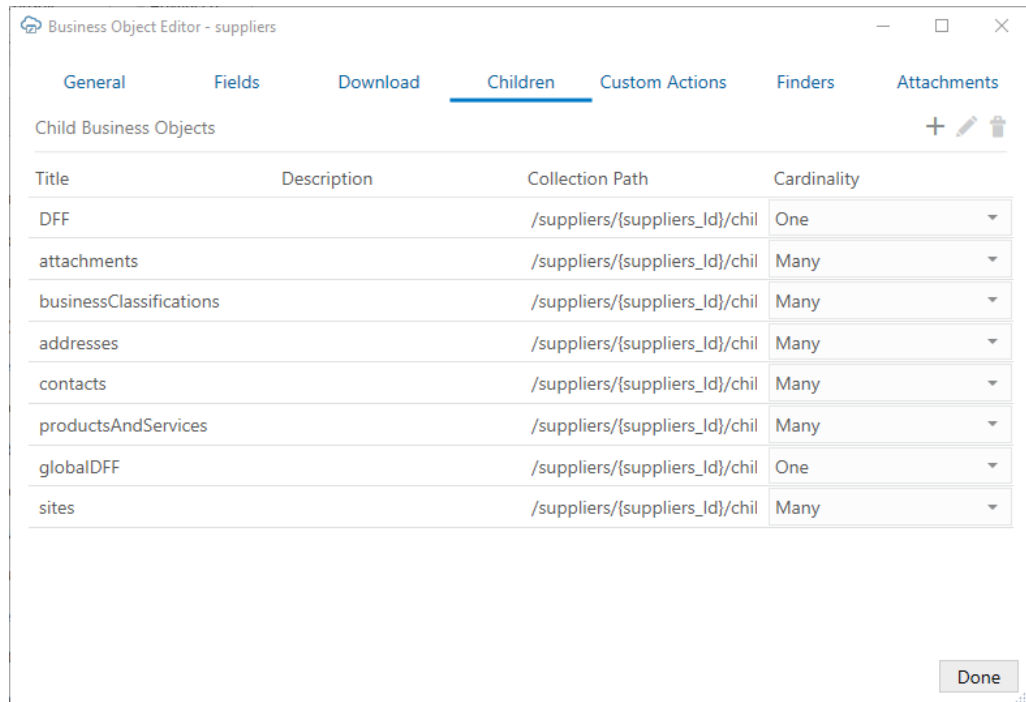
For example, an "Employees" business object may include a child polymorphic "Regional Information" business object that defines region-specific information for employee records. The Regional Information business object contains a "Region" field that acts as a discriminator field. It also contains global segments for all records, such as "Site" and "Time Zone", as well as context-sensitive segments such as a "Postal Code/Zip Code" for employees in the North American region.

Check the Cardinality of Child Polymorphic Business Objects

You can determine if a child business object is in a "one-to-one" or "one-to-many" relationship with its parent by checking the "cardinality" setting for a child business object.

Child polymorphic business objects with a "one-to-many" relationship can be used directly in a layout. For those child business objects in a "one-to-one" relationship, you can add descriptive flexfields from the child to the parent business object layout.

To check the cardinality setting for a child business object, open the Business Object Editor for the parent business object, then click the **Children** tab.



Cardinality options are "One", "Many", or "Unknown". Child business objects with a cardinality of "Many" (one-to-many relationship) can be used directly in a layout. Those with a cardinality of "One" can be added as fields to the parent business object layout. See [Create a Layout Using Descriptive Flexfields](#).

 **Note:**

For workbooks created before Oracle Visual Builder Add-in for Excel version 3.2, the cardinality is set to "Unknown". This value behaves identically to a value of "One" for polymorphic business objects. The cardinality value does not impact the behavior of non-polymorphic business objects.

Create a Layout Using Descriptive Flexfields

When you create a Table or Form-over-Table layout, you can add descriptive flexfields (DFF) from a child business object to the parent layout if the child is in a "one-to-one" relationship with the parent. DFFs are indicated in the New Layout Setup wizard by an Information icon (i).

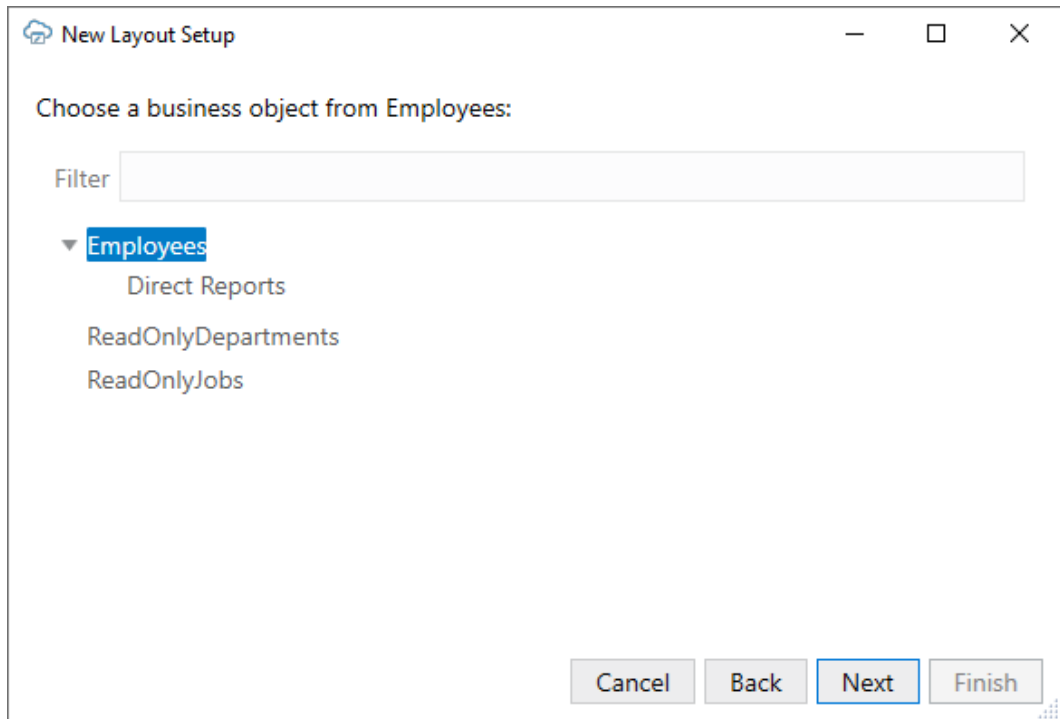
Top-level polymorphic business objects as well as child business objects with a "one-to-many" relationship with their parent can also be added to the layout as you would any other business object. See [Create a Table Layout in an Excel Workbook](#) and [Create a Form-over-Table Layout in an Excel Workbook](#).

To determine the relationship of a child business object to its parent, check its Cardinality setting. See [Check the Cardinality of Child Polymorphic Business Objects](#).

To create a layout with DFFs:

1. Create a new worksheet for your Table or Form-over-Table layout and click **Designer** to launch the **New Layout Setup** wizard.

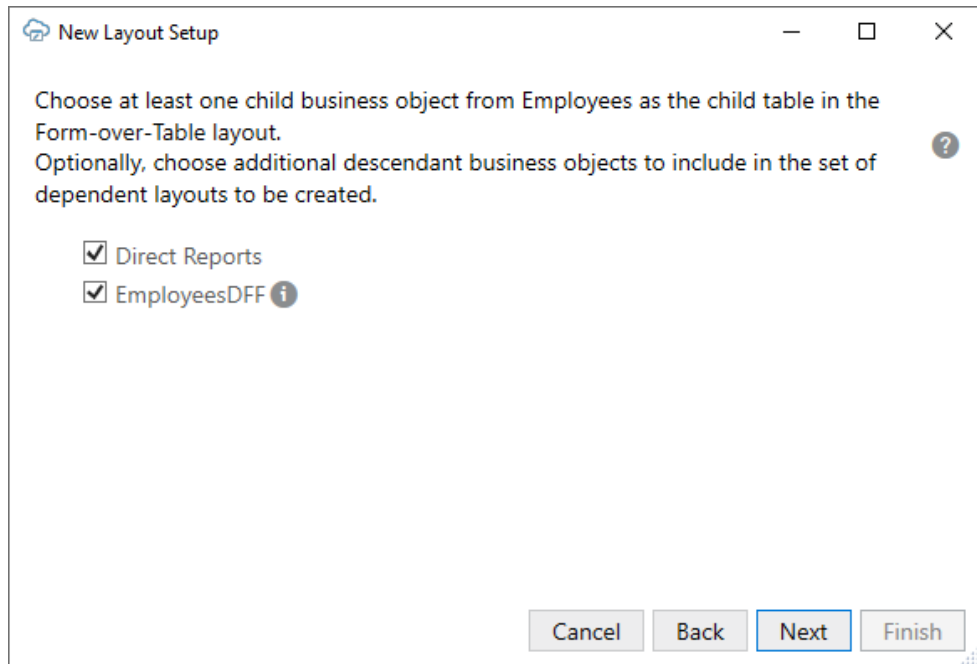
2. Follow the instructions in the wizard, selecting the DFF's ancestor business object when prompted in the second screen.



In this example, the Employees business object is selected for the parent layout.

3. When prompted, select either **Table Layout** or **Form-over-Table**.
4. When you reach the fourth screen of the wizard, you are prompted to select descendant business objects for your layout or layouts.

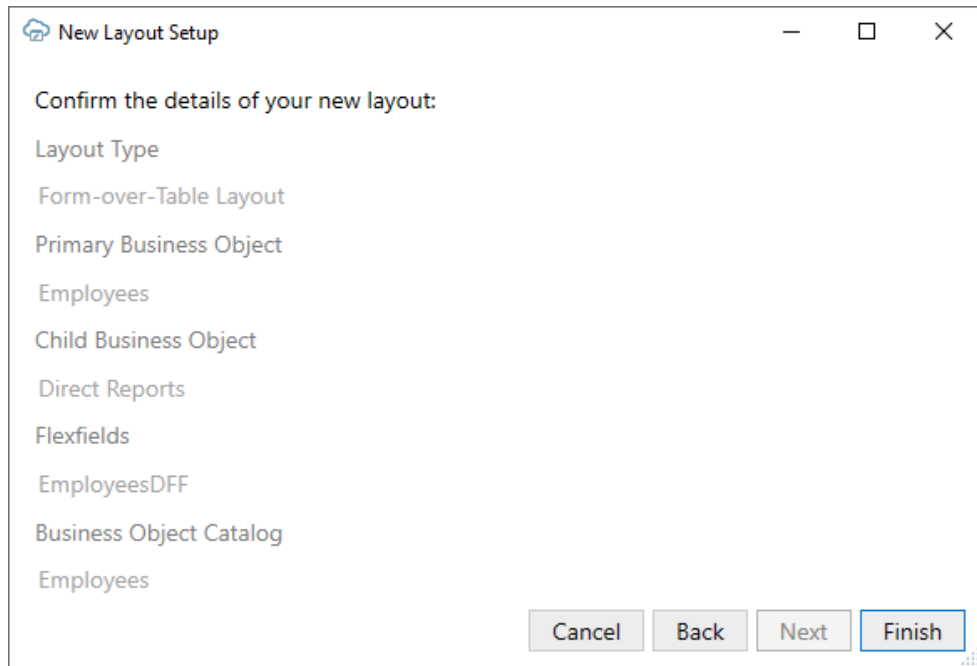
In this example, both **Direct Reports** and **EmployeesDFF** are selected. EmployeesDFF represents a DFF that is in a one-to-one relationship with Employees, as indicated by the Information icon (i).



If you select EmployeesDFF, the add-in adds the flexfields to the parent layout, Employees.

If you choose to create a Form-over-Table layout, the add-in creates a layout with Employees in the form and Direct Reports in the table. If you instead choose Table layout, the add-in creates a dependent Table layout for Direct Reports.

5. When you reach the final screen in the wizard, review the details of the new layout, then click **Finish**.



In this example, the add-in creates a Form-over-Table layout with Employees in the form and Direct Reports in the table as shown in this image:

	A	B	C	D	E	F	G	H	I
1	Employee								
2	Phone #	515.123.4567	Id*	100					
3	First Name	Steven	Last Name*	King					
4	Email*	SKING	Hire Date*	6/17/2003 0:00					
5	Job Title*	President	Salary	24,000.00					
6	Commission %		Manager Id						
7	Department	Executive	Site	HQ					
8	Time Zone	GMT-7	Region	United States					
9	Zip Code	12345	State	CA					
10									
11									
12	Change	Status	Phone #	First Name	Last Name*	Email*	Hire Date*	Job Title*	Sal
13			515.123.4568	Neena	Kochhar	NKOCHHAR	9/21/2005 0:00	Administration Vice President	17,00
14			515.123.4569	Lex	De Haan	LDEHAAN	1/13/2001 0:00	Administration Vice President	17,00
15			650.123.1234	Matthew	Weiss	MWEISS	7/18/2004 0:00	Stock Manager	8,00

The add-in also adds the Region flexfields from EmployeesDFF to the form (bordered in red). The flexfields include a "discriminator" field ("Region"), two global segments ("Site" and "Time Zone"), and two context-sensitive segments ("Zip Code" and "State"). The context-sensitive segments are dependent on the value of the Region field (in this case, "United States").

If the required flexfields do not appear in the layout by default, you can add them to your form or table from the Layout Designer. See [Add Descriptive Flexfields to a Layout](#).

You can also show or hide context-sensitive segments based on the discriminator value. For example, you could choose to show the context-sensitive segments for Canada ("Postal Code" and "Province"), rather than the U.S. segments, ("Zip Code" and "State"). See [Show or Hide Context-Sensitive Columns in a Table Layout](#).

Add Descriptive Flexfields to a Layout

You can add descriptive flexfields (DFF) to forms and tables using the Form Field Manager or Table Column Manager and place them anywhere in the form or table. Descriptive flexfields are a type of polymorphic business object that has a one-to-one relationship with its parent. See [Overview of Descriptive Flexfields](#) for more information on DFFs.



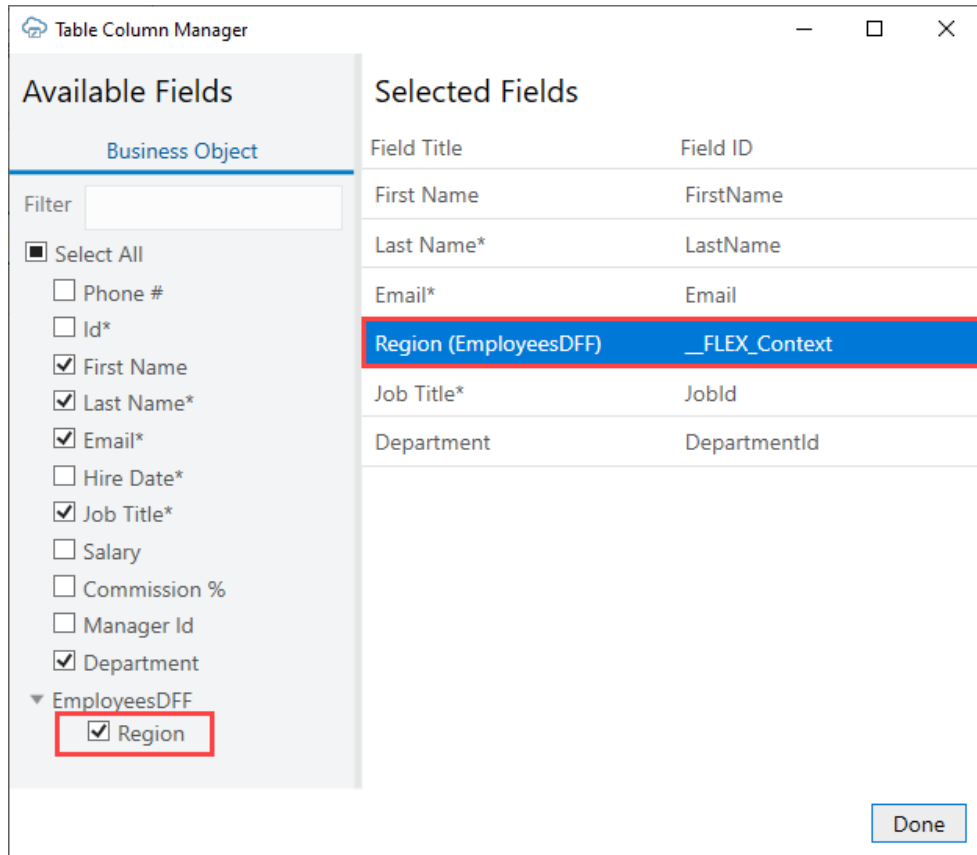
Note:

For polymorphic business objects in a one-to-many relationship, refer to [Create a Layout Using Descriptive Flexfields](#) instead.

1. Open the worksheet with the layout that you want to modify.
2. Click either the **Form** or **Columns** tab in the Layout Designer as needed.
3. Click the Manage Form Fields or Manage Columns button (+) to add your DFF.

Available DFFs are identified by the title of the discriminator field (in this case, "Region") and appear at the bottom of the list of available fields. The field ID is the discriminator field ID ("__FLEX_Context").

- Select the DFF from the Available Fields list.



You can also change the order of fields in the form or table by dragging and dropping fields in the Selected Fields list.

- Click **Done**.

The associated segments appear in the layout in the following order: global segments, the discriminator, and context-sensitive segments.

Context-sensitive columns for all possible discriminator values are included in the table. However, only those cells in a row that are relevant to the value in the discriminator field are editable. All other context-sensitive cells are read-only (grayed out).

F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Job Title*	Phone #	Email*	Site	Time Zone	Region	Zip Code	State	Postal Code	Province	Hire Date*	Salary	Manager Id	Departme
President	515.123.4567	SKING	HQ	GMT-7	United States	12345	CA			6/17/2003 0:00	240,000.00		Executive
Administration VP	515.123.4568	NKOCHHAR	Burlington	GMT-4	United States	54321	MA			9/21/2005 0:00	170,000.00	100	Executive
Administration VP	515.123.4569	LDEHAAN	Toronto	GMT-4	Canada			A1A 1A1	Ontario	1/13/2001 0:00	172,000.00	100	Executive
Programmer	590.423.4567	AHUNOLD	Toronto	GMT-4	Canada			A1A 1A1	Ontario	1/3/2006 0:00	98,000.00	102	IT

In a form, the context-sensitive form fields relevant to the current discriminator value appear after the discriminator field. Context-sensitive fields that are not relevant are

not included in the form. If you change the value in the discriminator field, the form automatically updates to include the relevant context-sensitive field for that value.

	A	B	C	D
1	Employee			
2	Phone #	515.123.4567	Id*	100
3	First Name	Steven	Last Name*	King
4	Email*	SKING	Hire Date*	6/17/2003 0:00
5	Job Title*	President	Salary	240,000.00
6	Site	HQ	Time Zone	GMT-7
7	Region	United States	Zip Code	12345
8	State	CA		
9				
10				
11	Change	Status	Phone #	First Name Last
12			515.123.4568	Neena

Show or Hide Context-Sensitive Columns in a Table Layout

You can select which context-sensitive columns you want to display for a polymorphic business object, using the **Polymorphic Information** tab of the Business Object Field Editor.

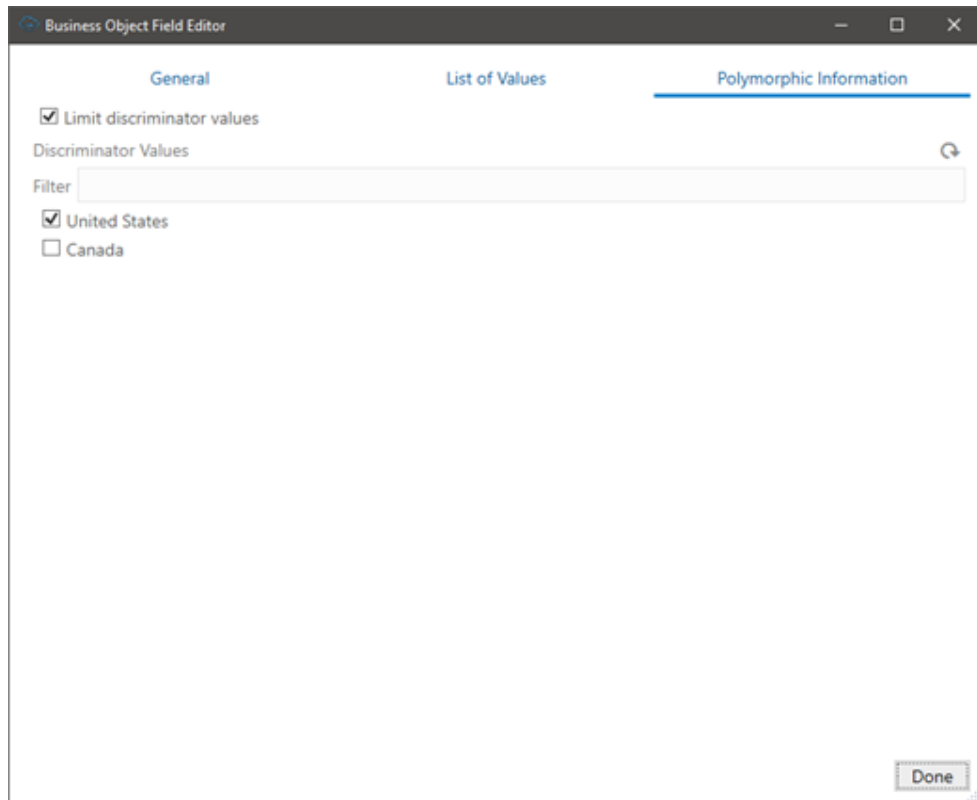
All context-sensitive columns are shown by default. You may want to use this task to hide columns in a layout. For example, in the case of a Region polymorphic business object, you may choose to show regional information only for U.S. employees and hide it for all others.

To show or hide context-sensitive columns:

1. Open the worksheet with the layout that you want to modify.
2. From the Layout Designer, click the Edit icon (✎) next to the Business Object field.
3. From the Business Object Editor, click the **Fields** tab and then select the business object's field.
4. Click the Edit icon (✎) in the Business Object Editor to open the Business Object Field Editor.
5. From the **Polymorphic Information** tab, select **Limit discriminator values**.
6. To ensure you see all available discriminator values, click the Refresh icon (🔄) to fetch the latest polymorphic metadata from the service.

This icon may be disabled if a refresh has already been performed during the current session.

7. From the Discriminator Values list, select the discriminator values for the context-sensitive segment columns that you want to display. For example, to show zip code and state columns in your Table layout, select the **United States** check box and deselect all others.



8. After you select or deselect discriminator values, close the open editors. The layout displays the context-sensitive segment columns you selected.

F	G	H	I	J	K	L	M	N	O	P	Q
Job Title*	Phone #	Email*	Site	Time Zone	Region	Zip Code	State	Hire Date*	Salary	Manager Id	Department
President	515.123.4567	SKING	HQ	GMT-7	United States	12345	CA	6/17/2003 0:00	240,000.00		Executive
Administration VP	515.123.4568	NKOCHHAR	Burlington	GMT-4	United States	54321	MA	9/21/2005 0:00	170,000.00	100	Executive
Administration VP	515.123.4569	LDEHAAN	Toronto	GMT-4	Canada			1/13/2001 0:00	172,000.00	100	Executive
Programmer	590.423.4567	AHUNOLD	Toronto	GMT-4	Canada			1/3/2006 0:00	98,000.00	102	IT

Refresh Polymorphic Business Object Metadata

Clear polymorphic metadata when you publish a workbook to ensure the workbook gets the latest metadata. Oracle Visual Builder Add-in for Excel refreshes the polymorphic business object metadata during the first download operation performed after you open the published workbook.

Because polymorphic business object segments are configurable by customers and subject to change, metadata stored in the workbook may become stale.

To clear metadata when publishing a workbook, select **Clear all layouts** from the Publish Workbook window. See [Publish an Integrated Excel Workbook](#).

Polymorphic Support Limitations

Before creating layouts for polymorphic business objects or adding descriptive flexfields to a layout, review the limitations here:

- A polymorphic business object is assumed to only contain a single discriminator field. Multiple discriminators are not supported.
- The discriminator field must be a string.
- When a polymorphic column or form field expands, the order is global segments, the discriminator, and then context-sensitive segments. Note that:
 - Changing the order of the global segments or context-sensitive segments is not supported.
 - Hiding specific global or context-sensitive segments is not supported.
- In order to bind a polymorphic business object to a layout, it must expose polymorphic business object metadata. In an OpenApi3 describe document, this means that it must contain a "discriminator" and "oneOf" syntax in the schema for the business object. "anyOf" polymorphic business object syntax is not supported.
- Hierarchical polymorphic business objects are not supported. All polymorphic segments must be defined directly on the polymorphic business object in the OpenApi3 describe document.
- Extensible Flexfields (EFFs) that define polymorphic segments on array-based subfields are not supported.
- When a layout contains a polymorphic business object, the "fields" and "expand" query parameters should not be manually configured in the "Search Parameters" in the "Query" tab of the designer.
- The add-in assumes that polymorphic fields appear in the metadata in the following order: global segments, discriminator, context-sensitive segments. If that is not the case, the add-in may fail to correctly determine which segments are global and which are context-sensitive.
- The case where a child business object's fields are determined by a parent business object's discriminator value is not yet supported.
- Limiting discriminator values for a polymorphic business object displayed in a Table layout does not limit:
 - The set of values that can be chosen in a list of values (LOV) for a discriminator field
 - The values users can provide for a discriminator field

Manage Layout Capabilities

Each layout in Oracle Visual Builder Add-in for Excel enables you to perform various standard and custom actions in an Excel workbook, so long as the operation is supported by your service. You can enable or disable these supported capabilities to control their availability in a layout.

1. In the Excel ribbon, click **Designer** to open a workbook's Layout Designer.
2. Click **Advanced** to see the layout's capabilities. Here's an example of a Form-over-Table layout, indicating form capabilities and table capabilities:

The screenshot shows the 'Layout Designer' application window with the 'Advanced' tab selected. The window has a title bar with a close button and a dropdown arrow. Below the title bar are five tabs: 'General', 'Query', 'Form', 'Table', and 'Advanced'. The 'Advanced' tab is active and contains the following sections:

- Macro Support**
 - Post-download macro: [Empty text box]
 - Pre-upload macro: [Empty text box]
- Form Capabilities**
 - Download Enabled
 - Update Enabled
 - Create Enabled
 - Delete Enabled
 - Custom Actions Enabled
- Table Capabilities**
 - Update Enabled
 - Send Only Changed Data for Updates
 - Create Enabled
 - Delete Enabled
 - Custom Actions Enabled
- Upload**
 - Send Descendant Rows in Parent Payload
 - Parallel Requests: [Slider bar] 4

3. Select or deselect options as required. If the business object doesn't support an action, it won't be available for selection (like **Custom Actions Enabled** for the table as shown in this image). See [REST Operations](#) for more information about the REST support required for these options.

Layout Limitations

Here are some things to keep in mind when creating layouts for your integrated workbook using Oracle Visual Builder Add-in for Excel:

- Excel table objects, such as those created from the Excel ribbon using **Insert > Table**, are incompatible with the Table layouts used by the add-in.
- Do not save your workbook to the Excel 97-2003 workbook (.XLS) file format. Only the .XLSX and .XLSM file formats are supported. If you save to the .XLS format, the add-in disables commands in the **Oracle Visual Builder** ribbon.

5

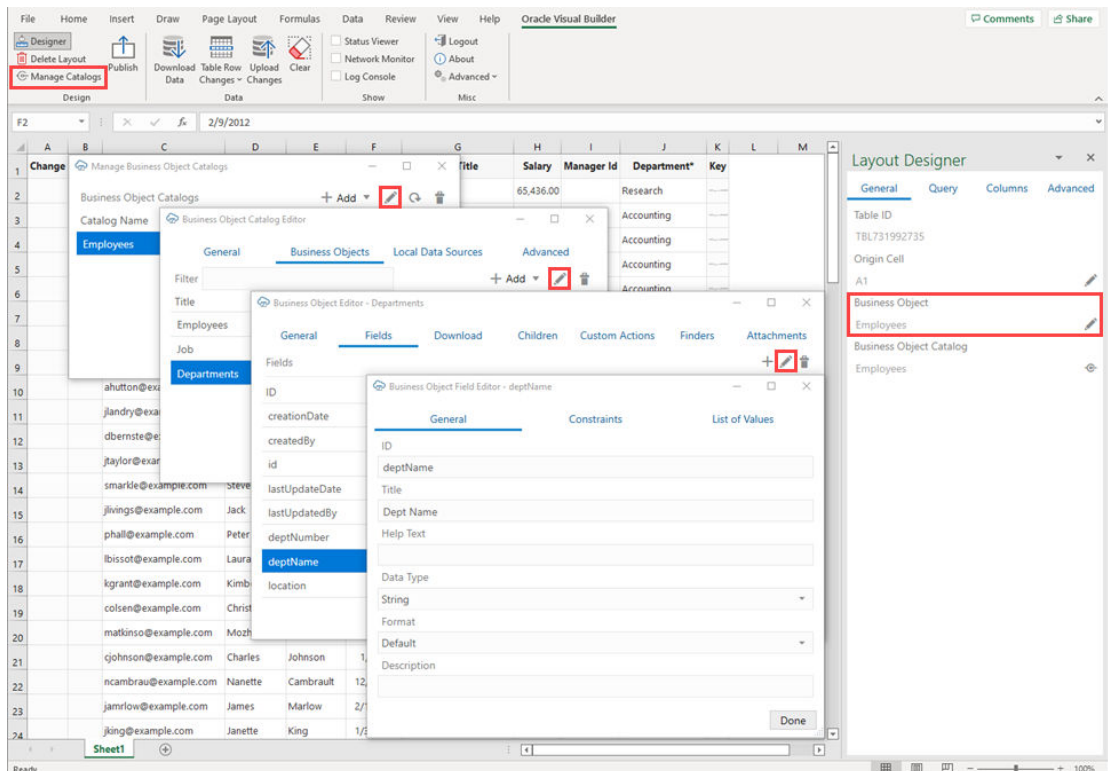
Manage Catalogs and Business Objects

When you create a layout, you provide the service description document for the REST service which Oracle Visual Builder Add-in for Excel uses to generate the Business Object catalog for your workbook. If required, you can use the available editors to modify the catalog in a variety of ways to enhance the overall user experience. For example, you can use the Business Object Field Editor to add help text to business object fields.

When you edit the details of business objects in your workbook, you're only telling the add-in how the service operates, you are not telling the service what it should do. Service behavior cannot be changed from the workbook. So any changes you make to the catalog in the workbook must be compatible with the service.

To view the editors progressively, start by clicking **Manage Catalogs** from the Oracle Visual Builder tab. This opens the Manage Business Object Catalogs editor. From here, you can choose a catalog and open the Business Object Catalog Editor, and so on.

You can also open the business object and business object field editors from the Layout Designer. Both options (using **Manage Catalogs** and the Layout Designer) are shown here:



Use these editors to perform the following tasks:

- Manage Business Object Catalogs: Let's you [import](#), open, and [refresh a catalog](#)

- Business Object Catalog Editor: Let's you configure the host and base paths for a catalog, as well as configure the business objects in the catalog. You can also configure more advanced settings such as [authentication](#), [GZIP](#), and the [REST API Framework](#).
- Business Object Editor: Let's you [override the base path](#) of the object, view [service description path details](#), configure [pagination](#), and configure [row finders](#)
- Business Object Field Editor: Let's you edit field titles, change when a field is editable, adjust the field data types (Advanced), and configure [Help text](#). You can also configure the [list of values](#) for a field.



Note:

When reading through the topics in this section, you'll come across many terms such as OpenAPI, REST service, and path. Before you begin, refer to [Key Concepts, Components, and Terms](#) to familiarize yourself with some of these terms.

Add Business Objects to an Existing Catalog

If your catalog is missing one or more business objects, you can add new business objects to the catalog using the Business Object Catalog Editor. These new business objects must be available at the same host as the other business objects in that catalog.

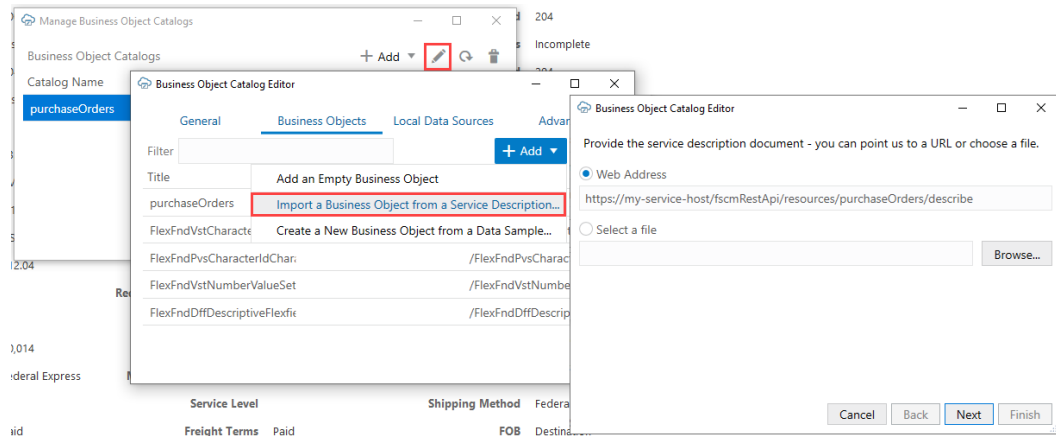


Note:

The REST API type of the new business object must match the catalog. For example, you can't add an Oracle REST Data Services business object to a Oracle business object REST API catalog.

This is particularly useful when configuring a list of values.

1. Click **Manage Catalogs**.
2. In the **Manage Business Object Catalogs** window, select your existing catalog and click the Edit Business Object Catalog (✎) icon.
3. From the **Business Object Catalog Editor**, click **Business Objects**.
4. From the **Business Objects** tab, click **+ Add**, then select **Import a Business Object from a Service Description** from the menu.



5. Provide the URL or a file that contains the OpenAPI description of the new business object and click **Next**.
6. Select the business objects you want to add, then click **Next**. If the list is large, type text in the Filter field to filter the list.

The add-in only harvests the metadata for the selected business objects as well as any business objects referenced in any configured lists of values. The add-in also checks for and skips any duplicate business objects.

When the add-in has imported the selected business objects, the wizard displays details of the action.

7. Review the details of the new business object, then click **Finish**.

If there are any errors in the service description document, click **Save Report** to save the report to your local drive. Share this report with the service owner.

8. Click **Done** first in the **Business Object Catalog Editor**, then in the **Manage Business Object Catalogs** window.

Import a Business Object Catalog

You can import a business object catalog by providing Oracle Visual Builder Add-in for Excel with the catalog's service description document.

You may also want to import an additional catalog if you need to use a different service at a different host or framework type.

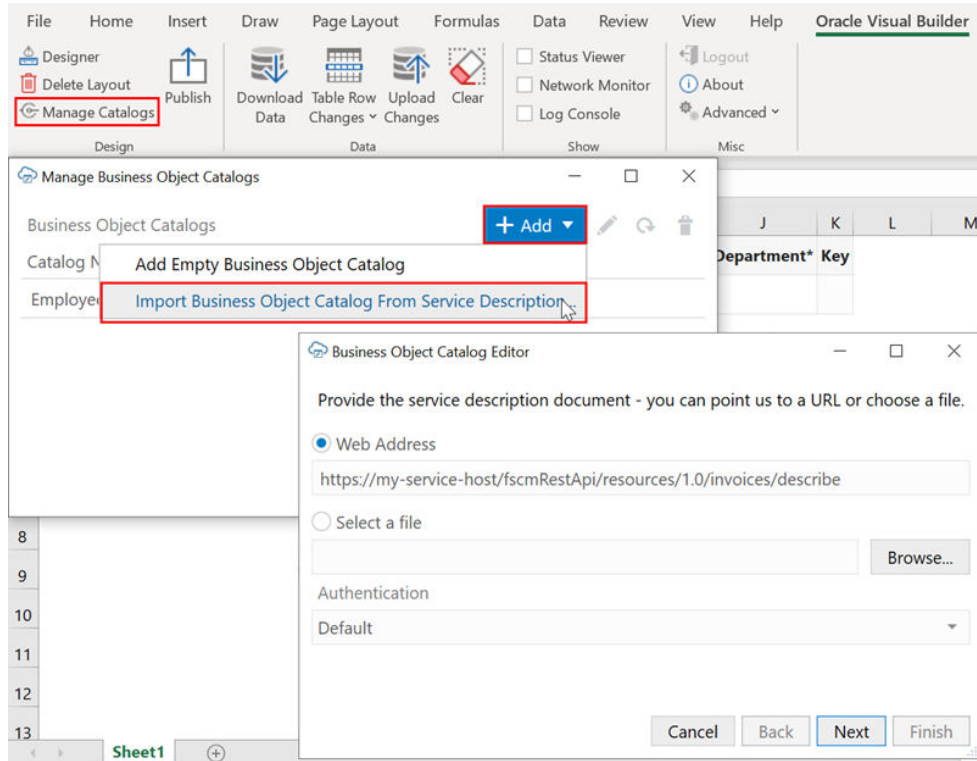
▲ Caution:

If you want to add an additional business object to your workbook, you should generally add it to your existing catalog. See [Add Business Objects to an Existing Catalog](#) for the steps.


To import a catalog:

1. Open the workbook where you want to import the catalog, then click **Manage Catalogs** from the Oracle Visual Builder ribbon.

- From the **Manage Business Object Catalogs** editor, click **+ Add**, then select **Import Business Object Catalog From Service Description** from the menu.



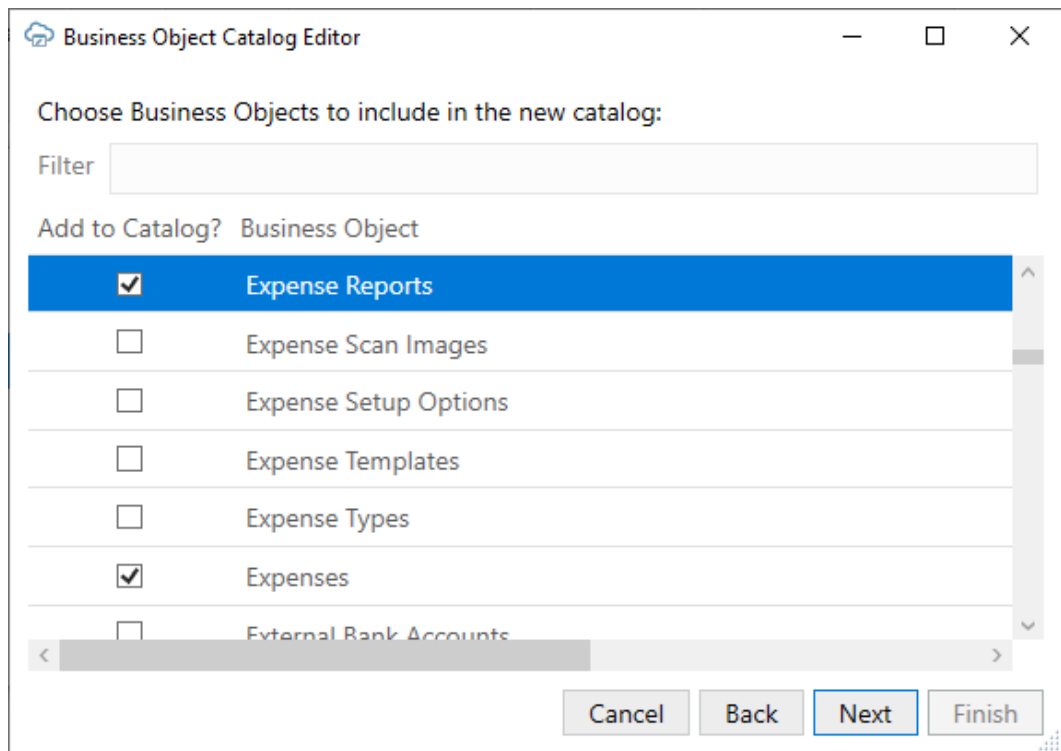
- Provide the URL for the service description document.

 **Note:**

If you are importing a Oracle business object REST API catalog, it is recommended that you use minimal mode to limit the amount of metadata retrieved for an application.

To use minimal mode, append the `metadataMode=minimal` query parameter to your URL like this: `.../fscmRestApi/resources/latest/describe?metadataMode=minimal`

- If required, provide authentication details, then click **Next**.
 For more information about authentication settings, refer to the authentication configuration steps in [Create a Table Layout in an Excel Workbook](#).
- If the service includes five or more business objects, select the business objects you want to include in the catalog, then click **Next**.



The add-in only harvests the metadata for the selected business objects as well as any business objects referenced in any configured lists of values.

The wizard displays details of the newly-created catalog, such as the catalog name, service host and basepath, and number of business objects.

6. Review the new catalog details.

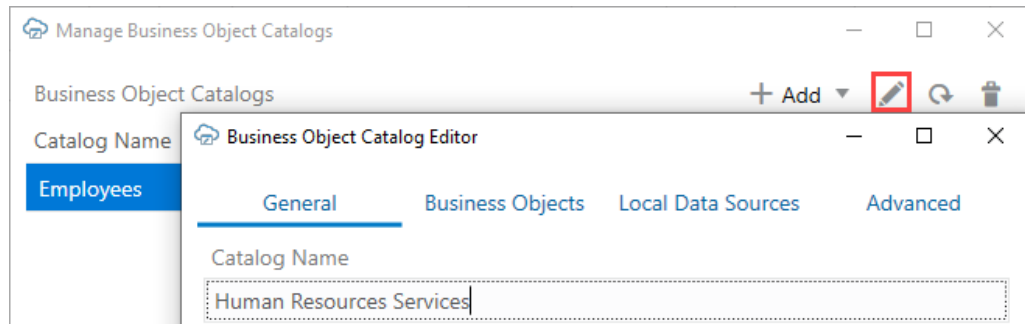
 **Note:**

If there are any errors in the service description document, click **Save Report** to save the report to your local drive. Share this report with the service owner.

7. Click **Finish** to close the Business Object Catalog Editor wizard.

Once the catalog has been created, review other topics in this and other chapters to see how you can improve the catalog for your workbook's layouts. For example, you may want to add help text or lists of values to fields in the new catalog's business objects. See [Add Help Text to Your Workbook](#) or [Use Lists of Values in an Excel Workbook](#).

You may also want to edit the name of the catalog in the Business Object Catalog Editor to make it easier to understand its purpose. Very often, the title that the add-in displays for the catalog in the Excel workbook is the name of one of the business objects that the service exposes. For example, this image shows a catalog in which the default value for the Title property is "Employees". This catalog exposes an Employees business object, so to avoid confusion, you can change the title that the catalog uses in the Excel workbook to something like `Human Resources Services`.



 **Note:**

Certain OpenAPI document properties, such as Description, can contain formatting hints. The add-in displays the description text as is, with no interpretation of such hints.

Create a Business Object Catalog from a Data Sample

Use Oracle Visual Builder Add-in for Excel to create a business object catalog from a data sample when you don't have an OpenApi-compliant service description.

If you have the host, base path, and resource name for the service description, the add-in can form the REST endpoint URL and send a GET request to the service to fetch a sample of data. The add-in can then use this sample to produce a list of fields available for that REST resource.

The add-in does this by first analyzing the JSON response to find the first JSON array available. It then selects the first JSON object in that array and, from this object, produces a list of business object fields. The add-in then creates a new business object in the catalog with that list of fields.

This new business object includes best guesses for the following:

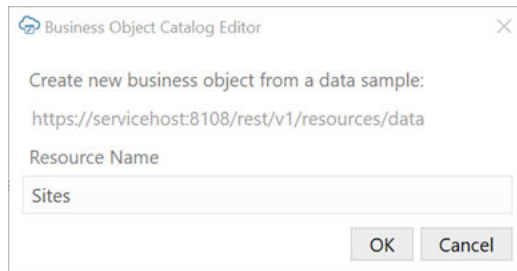
- The Collection Path including GET and POST (create) operations
- Item Path including GET, PATCH (update), and DELETE operations
- Field properties such as data type

 **Note:**

These guesses may not match the actual capabilities of the service. It is recommended that you review the business object definition and make sure it matches the service.

1. Click **Manage Catalogs** from the Oracle Visual Builder ribbon.
2. Open the desired catalog or create a new one.
Make sure the Host and Base Path properties are set correctly.

3. From the Business Objects tab, click **+ Add**, then select **Create a New Business Object from a Data Sample** from the list.
4. Type in the name of the desired resource and click **OK**.



5. Review the business object definition to ensure it matches the service. Here are some things to watch for:
 - If the service does not support delete, remove that operation from the item path or turn off delete in any layout that uses this business object.
 - If a given field is required or read-only, update the field settings from the General tab of the Business Object Field editor. Date fields may appear as string fields. Adjust the data type of fields as needed.
 - The add-in can't determine the data type of fields with null values. In these cases, the data type is set to "unsupported". These fields are not eligible for layouts, search, and so on. For these fields, correct the data type using the Business Object Field editor.
 - The add-in guesses that the primary key field is named "id". If the primary key field has a different name, use the Business Object Editor to update the item path as well as the parameter on each operation in the item path.

Configure Business Object Fields

Use the Business Object Field Editor to view and modify field settings as required.

Many of these settings control the appearance and behavior of the fields in your workbook and can be modified as desired. For example, you can enhance the usability of your workbook by:

- Changing a field title to something more intuitive.
- Overriding the default format for a field.
- Adding help text to help your business users understand the purpose of the field.
- Defining custom field validation rules.
- Requiring the business user to provide a value for a field in the search prompt.
- Adding a list of values to ensure your business users can only enter a valid value for the field.



⚠ WARNING:

Some settings in the editor come from the service description document and reflect how the REST service behaves. Changing these settings in the workbook cannot change the behavior of the service and may result in errors from your REST service. Refer to the notes in the table for recommendations for each field.


To modify the settings for a business object field:

1. Open the business object that includes the field in the Business Object Editor.
You can navigate to the Business Object Editor from the Layout Designer or by clicking **Manage Catalogs**, then opening first the catalog and then the business object.
2. From the Business Object Editor, click the **Fields** tab.
3. Select the field you want to modify, then click the Edit icon (✎) to open the field in the Business Object Field Editor.
4. From the **General** tab, view or modify the settings as appropriate.

Setting	Description
ID	The ID for the field. <div style="border: 1px solid #ccc; background-color: #fff9c4; padding: 10px; margin-top: 10px;">⚠ WARNING: Do not modify the ID. The ID value must match the JSON member name expected by the service. JSON member names are case-sensitive.</div>
Title	The name of this field. This value is used in various places, such as for the column header or form field label. This value can be localized. Provide a short value that is meaningful to your business users.
Help Text	A description of the field intended for business users. This value appears near the title where possible. This value can be localized. Provide a brief explanation of what values are expected for this field. See Add Help Text to Your Workbook

Setting	Description
Data Type	<p>The data type for the field, used for encoding and decoding data from the service, as well as data validation and cell formatting.</p> <p>Data types include values such as:</p> <ul style="list-style-type: none"> • Boolean • Date (no time) • Date-Time • Integer • Number • String <p>See Supported Data Types.</p> <div style="border: 1px solid #ccc; background-color: #fff9c4; padding: 10px; margin-top: 10px;"> <p> WARNING:</p> <p>Do not modify the data type without consulting the service owner.</p> </div>
Format	<p>The cell formatting setting for the field.</p> <p>The default setting (Default) indicates that the field uses the standard formatting for the data type, for example, <i>mm/dd/yyyy</i> for date fields.</p> <p>To use a different format style, select an option from the list such as Long Date for a date field. This option displays "7/15/2022" as "Friday, July 15, 2022".</p> <p>See Choose Field Formats.</p>
Description	<p>An internal technical description for the field.</p> <p>This value only appears in the designer. It is not localizable.</p>
Subfields	<p>The subfields for a object-typed field such as those available in NetSuite SuiteTalk REST web services.</p> <p>To make changes to a subfield, select it from the Subfields table, then click the Edit Field  to open the Business Object Field Editor for the subfield. See Object-typed Fields and Sub-fields.</p>

5. From the **Constraints** tab, view or modify the settings as appropriate.

Setting	Description
Required for update and Required for create	<p>Ensures a value is provided for the field during create or update:</p> <ul style="list-style-type: none"> • If the check box is selected, the add-in checks that there is a value in the field cell and displays a data entry error if there is no value. The business user won't be able to upload the new or updated row until a value is provided. See <i>Understanding Data Validation in Managing Data Using Oracle Visual Builder Add-in for Excel</i>. • If the check box is not selected, the add-in doesn't require a value. The business user can upload the new or updated row without a value for this cell.
	<div style="border: 1px solid #ccc; padding: 10px; background-color: #fff9c4;"> <p> WARNING:</p> <p>Don't deselect these check boxes without first consulting with the REST service owner. These settings come from the service description document and reflect requirements of the REST service.</p> <p>If you deselect these check boxes, the add-in attempts to upload the new or changed row. If the field is required and no value is provided, the service may return an error similar to a "(400) Bad Request" error.</p> <p>See Required Fields.</p> </div>
Editable on update and Editable on create	<p>Allows or prevents write operations on the field during create or update:</p> <ul style="list-style-type: none"> • If the check box is selected, the business user can provide a value during create or update. • If the check box is not selected, the field cells are set to read-only. <p>See <i>Understanding Read-Only Behavior in Managing Data Using Oracle Visual Builder Add-in for Excel</i>.</p>

Setting	Description
Searchable	<p>Determines if a field can be used in a search.</p> <p>If selected, the field is available when creating a search for the workbook. See Use Search to Find Required Data.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p>⚠ WARNING:</p> <p>The default value depends on the service description document. Make sure that the service supports searching on the field before selecting this check box.</p> </div>
Required for search	<p>Determines if a value is required for the field during a search:</p> <ul style="list-style-type: none"> • If the check box is selected, a value must be provided for the field on download. Required fields are indicated by an asterisk (*) in the Search Editor. • If the check box is not selected, no value is required. If none is provided, the add-in ignores the field when retrieving data. <p>See Use Search to Find Required Data.</p>
Omit from payload if value is empty	<p>Determines if the field is omitted from the payload if the cell value is empty.</p> <p>If the check box is selected, empty values are omitted. See Omit Empty Values During Upload.</p>

6. Define a custom field validation rule using the **Validation Rule** and **Validation Failure Message** fields as described in [Create Field Validation Rules](#).
7. To configure a list of values on the field, click the **List of Values** tab and configure it as described in [Configure a List of Values with a Business Object](#).

Set an Authentication Method for a REST Service

Configure authentication for Oracle Visual Builder Add-in for Excel when connecting to the REST service.

When you create a new catalog from a URL, you can configure the authentication method depending on the service. The add-in supports five authentication methods: Default, Basic Access Authentication, Oracle Fusion Applications Token Relay, OAuth 2.0 Authorization Code (PKCE), and No Authentication.

At log in, the add-in uses this setting to determine how to log in. If required, you can change the authentication method using the Advanced tab of the Business Object Catalog Editor.

See [Authentication Options](#) for more information.

1. Click **Manage Catalogs**.

2. In the **Manage Business Object Catalogs** window, select your existing catalog and click the Edit Business Object Catalog icon.
3. In the **Business Object Catalog Editor**, click **Advanced**.
4. Select an authentication method from the **Authentication** list:
 - **Default:** At login, the add-in pings an Oracle Cloud Application anti-CSRF servlet endpoint. If the ping succeeds, Token Relay is used. If the ping fails, Basic authentication is used instead.
 - **Basic Access Authentication:** See [Basic Authentication](#).
 - **Oracle Fusion Applications Token Relay:** See [Oracle Fusion Applications Token Relay Authentication](#).
 - **OAuth 2.0 Authorization Code (PKCE):** See [OAuth 2.0 Authorization Code Flow](#).
 - **No Authentication:** There is no prompt for credentials. No authentication-related headers are added to requests.

 **Caution:**

Be sure to choose an authentication method that is compatible with your catalog. For example, Oracle Fusion Applications Token Relay is not supported with Oracle REST Data Services (ORDS). If you pick token relay for an ORDS catalog, authentication fails.

5. If you selected OAuth 2.0 Authorization Code (PKCE), click **Edit Authentication Flow Properties** and enter the required authentication properties. You can also use the **Import** button to upload a JSON file containing the authentication properties. See [OAuth 2.0 Authorization Code Flow](#).

Override a Business Object's Base Path

You can configure a business object to use a different base path than the rest of the catalog. The Oracle Visual Builder Add-in for Excel then uses this base path when making REST requests for the business object.

Typically, a Business Object Catalog holds business objects that share a base path (say, `/abcRestApi-context-root/resources/v1`). But if a business object needs to use a different base path (for example, your list of values come from `/123RestApi-context-root/resources/v1`), you can provide a new base path for the business object through the Business Object Editor.

To configure a business object to use a base path different from the one shared by business objects in the Catalog:

1. Add a business object to your Business Object Catalog. See [Add Business Objects to an Existing Catalog](#).
2. Click the **General** tab in the Business Object Editor, enter the different base path in **Base Path Override** to override the base path used by all business objects in the Catalog, and click **Done**.

Business Object Editor - Countries

General Fields Download Children Custom Action: Finders Attachments

Title
Countries

Description

Parent Business Object
Top-level business object (no parent)

Base Path Override
123RestApi-context-root/resources/v1

Use Upsert Mode for Create

Supports Batch Requests for Upload

Collection Path
/Countries Edit

Item Path
/Countries/{Countries_Id} Edit

Metadata Path
/Countries/describe Edit

Done

The add-in assumes that no extra authentication is required by business objects with a base path override.

You can now use the newly created business object as the data source business object for a list of values if required. See [Configure a List of Values with a Business Object](#).

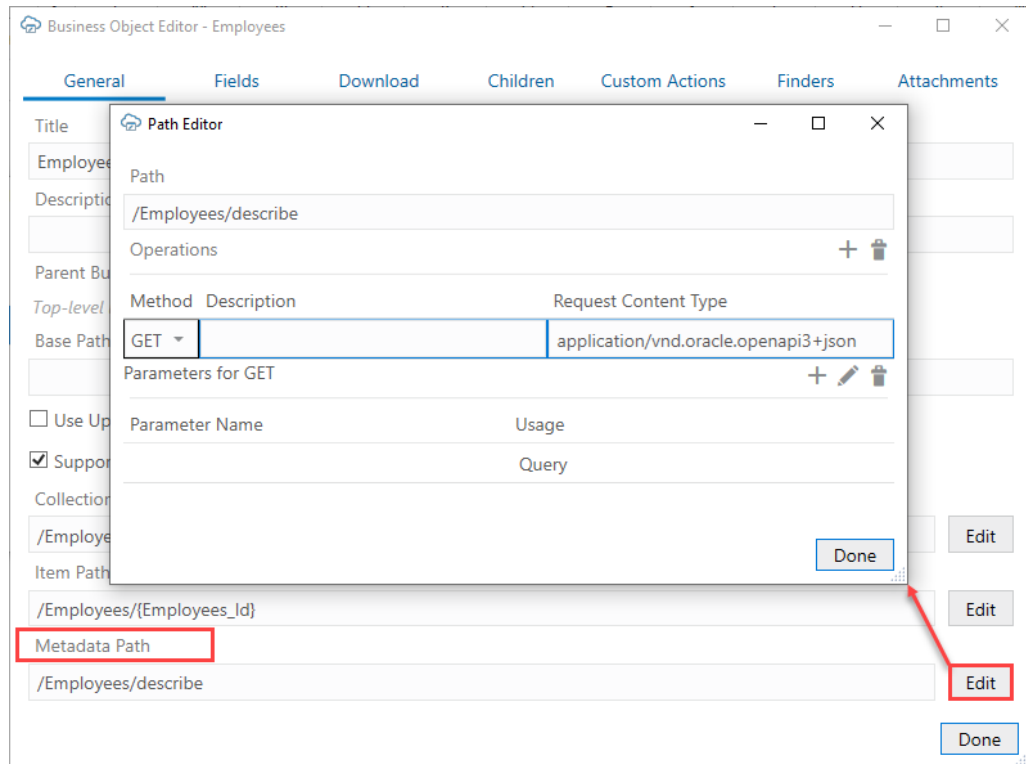
Manage Metadata Path Information

When you provide a service description document, Oracle Visual Builder Add-in for Excel captures the path to the service description document relative to the service host and base path of the catalog. You can view this path and other path settings from the Business Object Editor.

This relative path is displayed in the **Metadata Path** field on the **General** page of the **Business Object Editor**. It also captures path information such as REST API methods and parameters and displays these details in the **Path Editor**.

The add-in uses this path when you refresh the business object catalog. See [Refresh a Business Object Catalog](#).

View these settings by clicking the **Edit** button next to the **Metadata Path** field.



The values seen in this image are correct for an Oracle business object REST API service. Other service frameworks may require other values. For example, Oracle REST Data Services (ORDS) might have a metadata path of `"/open-api-catalog/employees"` and a content type of `"application/json"`. Refer to [Oracle REST Data Services](#) for more details.

⚠ Caution:

The metadata path should include a GET method that specifies the correct request content type that the service expects for a metadata request. If you need to modify these settings, be sure to provide values that will result in the service returning a proper OpenApi version 3.x service description.

Consult the REST API owner for the required values.

Configure Pagination for a Business Object

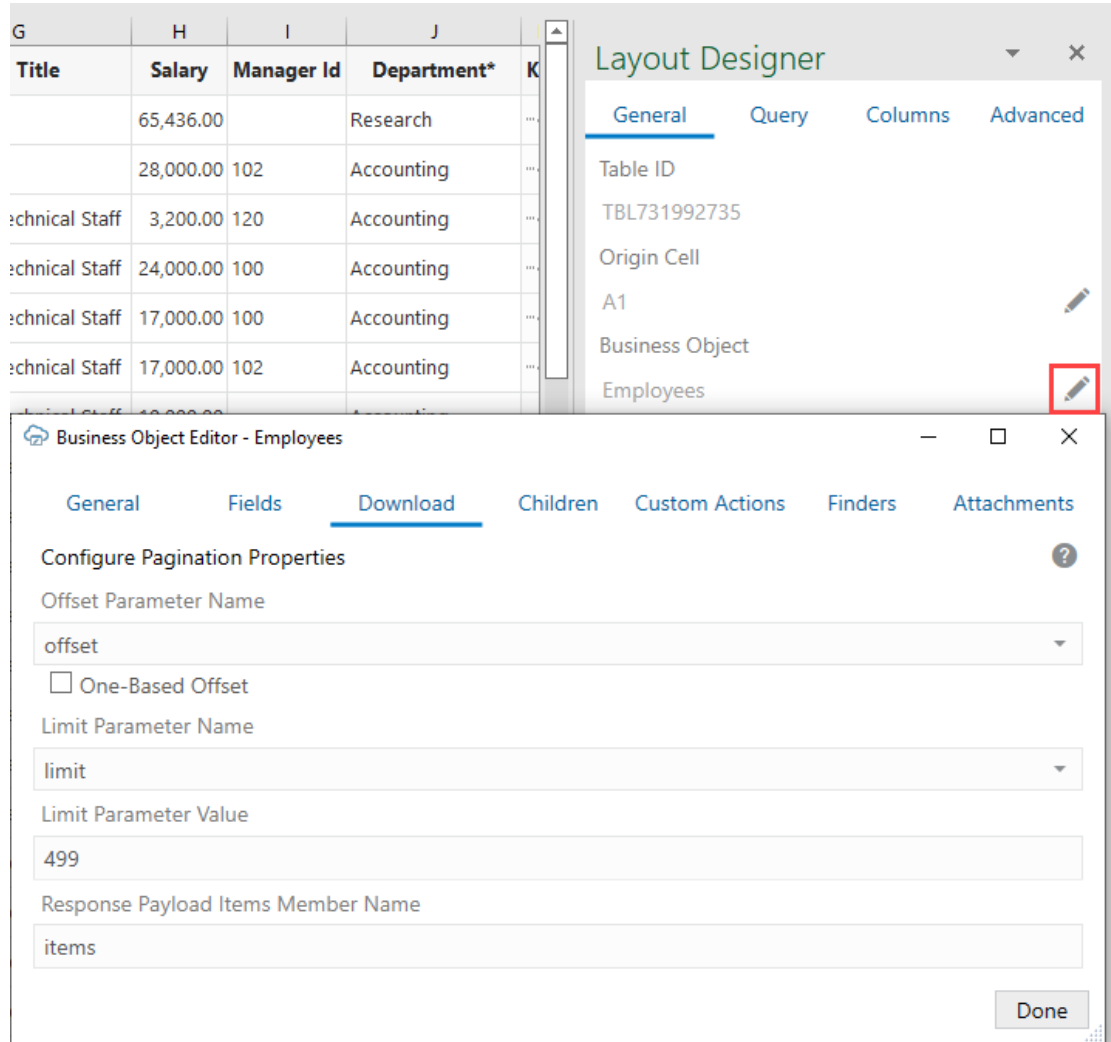
If the REST service supports pagination, you can download pages of rows.

Imagine you need to download 10,000 rows of data. Downloading one row at a time is too time-consuming, and attempting to download all 10,000 rows in one request might result in a timeout error. Instead, download one page at a time where the page contains, for example, 500 rows.

 **Note:**

Pagination does not limit the total number of rows downloaded. All available rows are downloaded with or without pagination. Pagination controls how many rows are downloaded *per request*. In the example here, there would be 20 requests of 500 rows to download all 10,000 rows.

You can configure the pagination behavior using the Download tab in the Business Object Editor.



The screenshot shows the Business Object Editor interface for the 'Employees' business object. The 'Download' tab is selected, and the 'Configure Pagination Properties' section is visible. The configuration includes:

- Offset Parameter Name:** A dropdown menu with 'offset' selected.
- One-Based Offset:** An unchecked checkbox.
- Limit Parameter Name:** A dropdown menu with 'limit' selected.
- Limit Parameter Value:** A text input field containing '499'.
- Response Payload Items Member Name:** A text input field containing 'items'.

A 'Done' button is located at the bottom right of the configuration panel. In the background, a 'Layout Designer' window is open, showing the 'Columns' tab with a list of columns for the 'Employees' table, including 'Title', 'Salary', 'Manager Id', and 'Department*'. A red box highlights the edit icon in the Layout Designer window.

Configure the following as required:

- **Offset Parameter Name:** The name of the URL parameter that controls where to start the next page. When fetching the first page, the add-in uses a value of zero. When fetching the second page, the add-in uses a value of 499, assuming the limit value is 499.
- **One-Based Offset:** Controls whether the service starts counting from one. If this check box is unselected, the service assumes the service starts counting from zero.
- **Limit Parameter Name:** The name of the URL parameter that controls how many rows to fetch for each page.

- **Limit Parameter Value:** Controls the page size (number of rows that the add-in downloads).

For example, using the defaults for a Oracle business object REST API service, the add-in appends `?offset=0&limit=499` for the first download request.

For other service types, pagination may or may not be supported. If supported, the service may use parameter names like `offset` and `limit` or it may use other parameter names for the same purpose.

Consult the service API documentation to determine which parameters to use.

Configure Row Finders for a Business Object

Row finders are predefined filters available through Oracle business object REST API services that allow you to download a specific subset of records. If the service owner has included row finders with the service, you can view and configure them through the Finders tab of the Business Object Editor.

For example, if your service includes a row finder that filters expense reports by "unapproved" status and assigned to the "current user", you can use the row finder to download only those expense reports that require your approval. See [Use Row Finders to Limit Downloaded Data](#).


Row finders are defined through the service. You can't add or configure them through Oracle Visual Builder Add-in for Excel. However, you can configure how they appear in the add-in. For example, you can

- Remove unwanted row finder variables so that they don't appear in the prompt at download time
- Give row finders or row finder variables a more readable title
- Add some help text to help your business users understand what a row finder does or what should go in a row finder variable field
- Configure a list of values for a row finder variable

Note:


Any changes you make must be compatible with the service. If your changes are incompatible, you will likely see errors during a download.

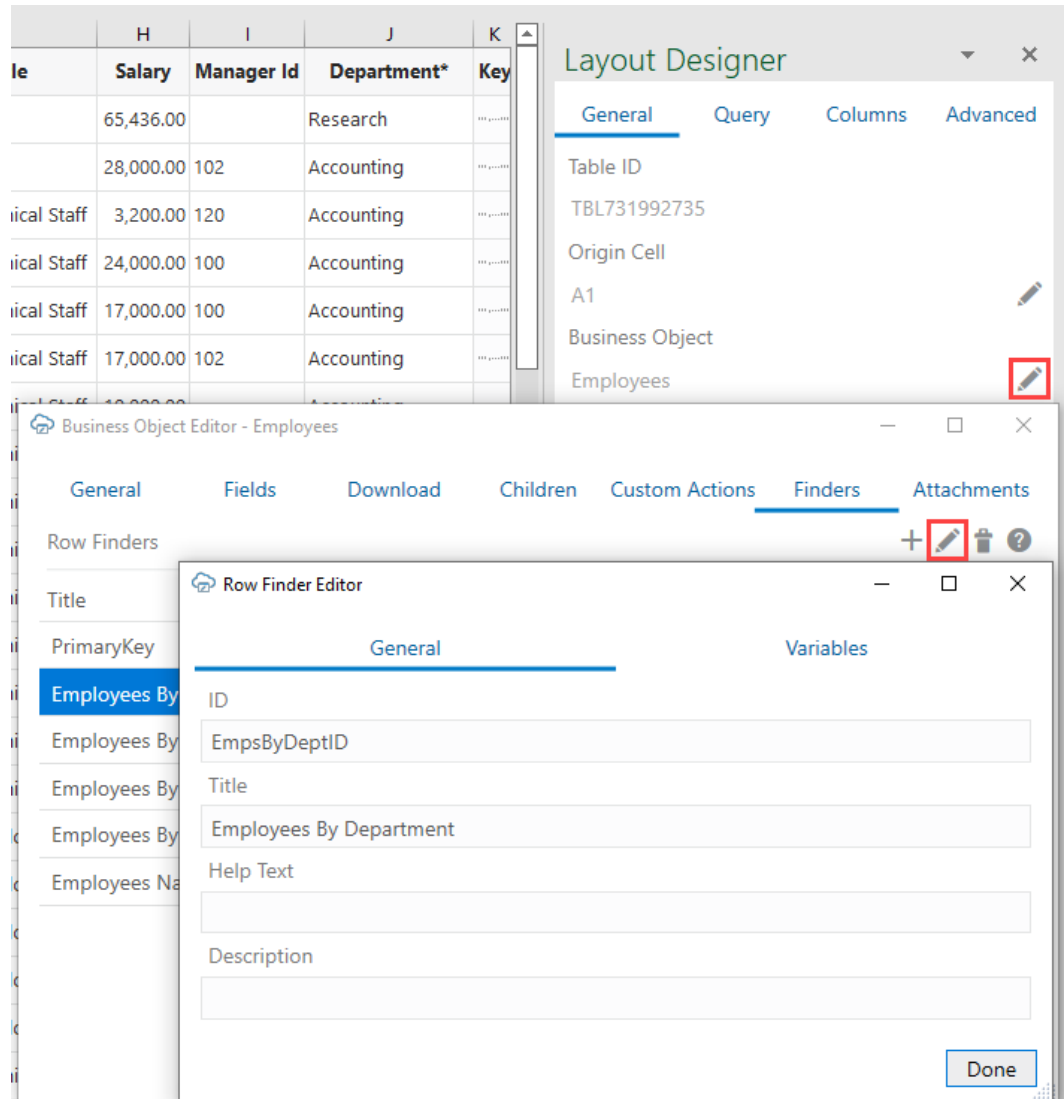
To configure row finders:

1. In the Excel ribbon, click **Designer**.
2. In the Layout Designer, click the Edit icon () next to the Business Object field.
3. Click the **Finders** tab in the Business Object Editor to view a list of available row finders. Remove row finders if required.

 **Note:**

The Finders tab is only displayed for Oracle business object REST API services and not for Oracle REST Data Services (ORDS) or other REST services.

- To edit a row finder's details, select it from the list and click the Edit icon ().



The screenshot shows a table of employees with columns for Salary, Manager Id, Department*, and Key. Overlaid on the table are two windows:

- Layout Designer:** A window with tabs for General, Query, Columns, and Advanced. The General tab is active, showing details for Table ID (TBL731992735), Origin Cell (A1), Business Object (Employees), and an Edit icon (pencil) which is highlighted with a red box.
- Business Object Editor - Employees:** A window with tabs for General, Fields, Download, Children, Custom Actions, Finders, and Attachments. The Finders tab is active, showing a list of Row Finders. The 'Employees By' row finder is selected, and its details are shown in a sub-window titled 'Row Finder Editor'. This sub-window has tabs for General and Variables. The General tab is active, showing fields for ID (EmpsByDeptID), Title (Employees By Department), Help Text, and Description. A 'Done' button is at the bottom right.

- Use the Row Finder Editor to edit the row finder.

 **Caution:**

When editing a row finder, take care to not change the row finder's ID.

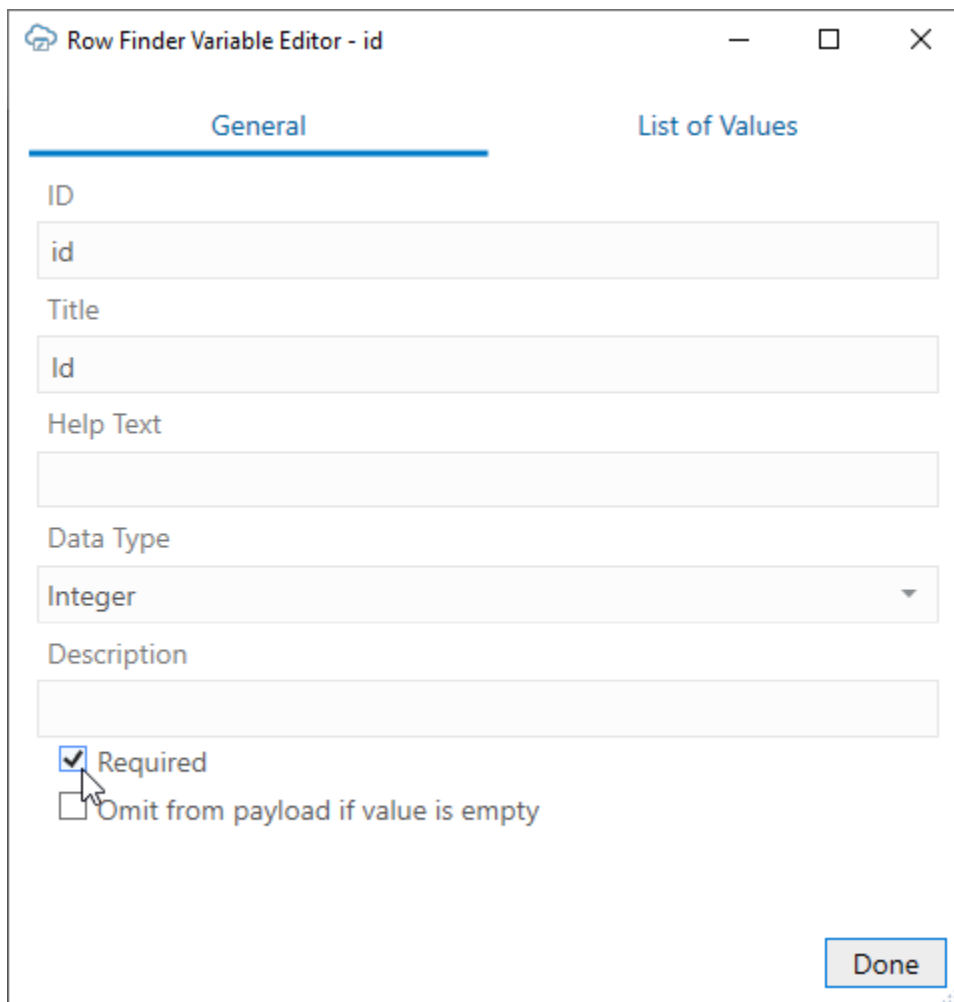
You might want to change the value for the **Title** property to be more readable. You can also add descriptions of the row finder using the **Help Text** and **Description** properties.

The **Help Text** property is intended to give your business users more information about the row finder. This text is displayed in a popup next to the row finder title in the Search Editor. The **Description** property is intended for workbook developers. This text is displayed only in the designer UI, like the Finders tab of the Business Object Editor. You can use this property, for example, to provide technical details of the row finder to workbook developers.

 **Note:**

The values for the **Title** and **Help Text** properties can be translated. See [Manage Workbook Translations](#).

6. If a row finder supports variables that act as arguments or parameters for the finder, click the **Variables** tab to update or delete variables. For example, you can change the row finder variable's title (but not the ID) or set the variable as required to force the user to provide a value at download time, as shown here:



Row Finder Variable Editor - id

General List of Values

ID
id

Title
Id

Help Text

Data Type
Integer

Description

Required
 Omit from payload if value is empty

Done

As with a row finder, you can use the **Help Text** and **Description** properties to provide useful descriptions of the variable. The **Help Text** value is displayed as a popup next to the row finder variable in the Search Editor.

 **Note:**

The values for the **Title** and **Help Text** properties can be translated. See [Manage Workbook Translations](#).

7. If required, configure a list of values for a row finder variable from the List of Values page in the Row Finder Variable Editor.

 **Note:**

A list of values is a drop-down list populated with values from a referenced business object or a local data source. Filters can also be defined to further limit the values to those required by the business user. These filters can contain expressions that are resolved at runtime. See [Configure a List of Values with a Business Object](#) and [About Expressions](#).

8. Click **Done** until you return to the Layout Designer. Once you are done making changes, the row finders become available to you as an option to limit downloaded data, as described in [Use Row Finders to Limit Downloaded Data](#). For details on how your configuration takes effect, see [Download Behavior in Layouts that Use Search and Row Finders](#).

Configure GZIP Compression for Request Payloads

For a POST, PUT, or PATCH request to the service that takes payloads, you can choose to compress the payload body using GZIP if the service accepts compressed request payloads.

When the **Supports gzip compression for request payloads** option is selected, the `Content-Encoding: gzip` header is added to the request. This option (found in the Business Object Catalog Editor's **Advanced** tab) is selected by default for Oracle business object REST API services.

Refresh a Business Object Catalog

If a service owner makes significant changes to the service description—especially its business object definition—after the workbook is integrated with the service, you can refresh the workbook's business object catalog to take advantage of the latest changes.

Refreshing a catalog is useful when changes to a service description are extensive—for example, when new fields, custom actions, or row finders are added to the service—and updating the business objects to incorporate these changes would take considerable time and effort. You can also refresh the catalog when a new version of Oracle Visual Builder Add-in for Excel improves the metadata harvesting.

Your catalog might be based on a single service description document that defines one or more business objects. But a catalog can also include business objects that you have imported separately and that have their own service description documents. When you refresh a catalog, Oracle Visual Builder Add-in for Excel reads the metadata path for each business object and issues a request that returns the business object details from the service description document.

You can only refresh a catalog with URL-based service description documents. Catalogs with file-based service description documents cannot be refreshed from a file.

▲ Caution:

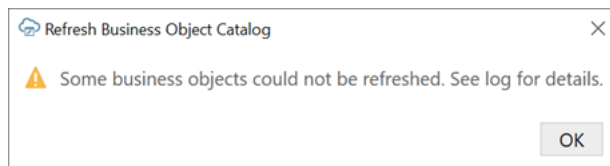
A refresh overwrites any changes that you've made locally to the business object catalog. If you've spent a lot of time customizing the business object (especially field titles), consider whether it's worth redoing those changes; it might be simpler to manually add that new field or custom action. Before refreshing a catalog, back up the workbook in case you want to revert your changes.

To refresh a business object catalog:

1. Click **Manage Catalogs** in the Oracle Visual Builder tab.
2. Select the catalog to refresh in the Manage Business Object Catalogs window.
3. Click the Refresh Business Object Catalog icon (🔄).
4. Click **OK**, then **Yes** when prompted to confirm the overwrite.

If a service host is missing or you have not logged in, you'll be prompted to provide the required details. If you cancel either of these prompts, the catalog refresh ends without completing.

If, once the catalog refresh is complete, you see this warning, then the add-in was unable to refresh one or more business objects in the catalog.



To troubleshoot the error, open the log console and repeat the process to discover the cause. See [Log Console](#).

If the catalog refresh ends successfully, the add-in displays a message that all business objects were successfully refreshed.

5. When the refresh is complete, click **OK** to close the message, then **Done** to close the **Manage Business Object Catalogs** window.

During the catalog refresh:

- Existing business objects are refreshed based on the response from the metadata path. New business objects are not added to the catalog. No business objects are removed.
- For existing business objects, new fields, finders, custom actions, and so on are added and existing items are refreshed. No existing items are removed.
- When an existing item is refreshed, the item's new properties replace the older properties. For example, a field's title, required, and editable properties are copied from the newer version to the older version, except when a new property is empty. If a field's newer version has a list of values configured, the newer list of values

replaces the older list of values. If the newer version doesn't have a list of values, the previous list of values is left unchanged.

- A refresh does not change any field formats, as those are always set manually.

If you want a new field in your layout, use the Table Column Manager to add the field after refreshing the catalog:

1. In the Layout Designer, click **Columns**.
2. Click Manage Columns (+) and select the new field. Click **Done**.

Configure the REST-Framework-Version

You can change the value of the REST-Framework-Version request header, set to version 6 by default for Oracle business object REST API services. The REST framework version determines functionality for accessing business objects.

To configure a specific REST-Framework-Version that overrides the default framework version:

1. In the Oracle Visual Builder tab, click **Manage Catalogs**.
2. Select the business object catalog, then click the Edit Business Object Catalog icon.
3. In the Business Object Catalog Editor, click the **Advanced** tab.
4. Specify the framework version you want to use in the **REST API Framework Version** property. This property is available only for Oracle business object REST API services (not ORDS or other REST services).

The default value is version 6 (the only supported value). If the value is empty or lower than 6, it is set to the default. Framework versions higher than 6 are not certified.

5. Click **Done**.

Once you specify a framework version, it stays in effect until you manually change it again. Every request sent to any endpoint that belongs to this catalog includes the REST-Framework-Version header with the specified value. For details on framework versions, see [About REST API Framework Versions](#).

6

Configure Search Options for Download

You can configure the search options for a layout, which are used when the user clicks **Download** in the Oracle Visual Builder tab.

Search Option	Available for	Benefits	Limitations
Graphical Search Editor	Oracle business object REST API, Oracle REST Data Services, and NetSuite SuiteTalk REST Web Services	<ul style="list-style-type: none">Provides a graphical user interface for building a searchAllows business user to provide values and modify the search	Some limits on search syntax
Row Finders	Oracle business object REST API	<ul style="list-style-type: none">Provides access to powerful, complicated searches defined by the serviceAllows the business user to provide values	Only available for Oracle business object REST API services
Search Parameters	Any service type	Developers can use any syntax the service supports	Business users cannot provide values or change the search at download time

Use Search to Find Required Data

For workbooks that integrate with Oracle business object REST API services and Oracle REST Data Services, you can configure each layout of the workbook to enable a user to specify search values that filter the data Oracle Visual Builder Add-in for Excel downloads to the layout.

For example, you might have a Form-over-Table layout that displays a purchase order in the form and associated lines in the table. In this scenario, you'll want to create a search that allows business users to enter the order number for a specific purchase order that they want to view.

You create a search for a layout by setting one or more search conditions. A search condition consists of a business object field, a query operator, and a value. A query operator determines how items are matched based on the given value and is based on the field's data type. For example, available operators for strings include "starts with", "contains", and "ends with". Those for numbers include "greater than" and "less than". For dates: "before" and "after".

To download data for employees making over \$95,000, for example, you'd choose the "Salary" field, select the "greater than" operator, and type "95000" in the value field.

If you configure more than one condition, the add-in always inserts the logical AND operator between each one. So, if you have two conditions such as "Job Title = Software Developer" and "Salary > 95000", the add-in downloads only those items that match both these conditions.

The add-in supports lists of values (LOV), including ones with dynamic filters, in the Search Editor. Let's suppose you want to download data for employees based on department and job title and have added the Department and Job Title fields to your search in order to do so. If the Department field has a LOV, you can choose the required department from the list. If the second field, Job Title, has a dynamic filter based on the Department field, the Job Title list shows only those job titles that are associated with the department you selected in the first field.

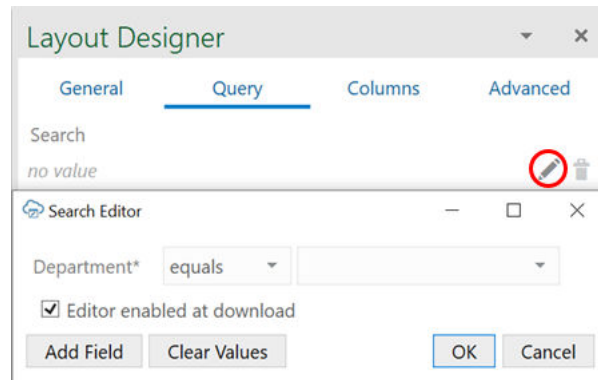
Note that there are two business object field settings in the Business Object Field Editor related to search:

- **Searchable:** If **Searchable** is selected for a field, the field is available for you to choose from. You can adjust which fields show by selecting or deselecting **Searchable** in the Business Object Field Editor. Before you set a field as searchable, make sure that the service supports searching on that field.
- **Required for Search:** If you want to require your business users to provide a value for a field when downloading data, select **Required for Search** for the field in the Business Object Field Editor. Required fields are indicated by an asterisk (*) in the Search Editor.
If a field is required, the business user must provide a value before proceeding. If a field isn't required and the business user leaves it blank, the corresponding condition is omitted from the search.

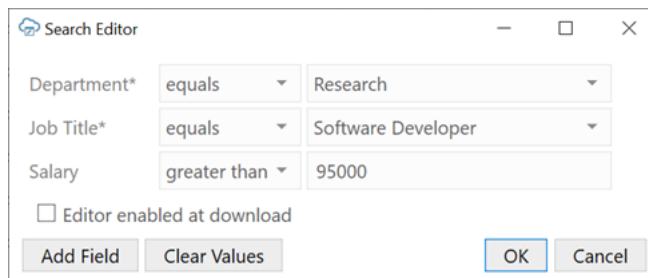
See [Configure Business Object Fields](#) for more information.

To create a search query for a layout:

1. Select the layout you want to create the search for, then click **Designer** from the Excel ribbon.
2. In the Layout Designer's Query tab, click the Edit icon (✎) next to the Search property.
If no search conditions have been defined, the add-in opens the **Available Business Object Fields** window.
3. To configure a search condition:
 - a. From the **Available Business Object Fields** window, select the business object field that you want to enable users to enter search terms for. If this window is not open, click **Add field** from the **Search Editor** first.
For example, select **Department Name** if you want to enable users to search on employees by department, as shown here:



- b. Select a query operator from the list beside the field name. For example, select "equals" to return employees from a department that matches the value in the value field or "not equals" to return only employees from other departments. The available operators depend on the data type. For example, string fields have filters such as "starts with", "contains", and "ends with".
 - c. If required, select or type a value in the value field you want to use to match items on download. For example, to download employees from the research department, select "Research". You can only specify a single value for this field. You can leave the value field blank if you want your business user to provide a value. If you do provide a value here, the business user can always change or clear the value when downloading.
4. To add more fields for complex searches, click **Add Field**, then select a field from the **Available Business Object Fields** dialog. For example, you might want to search for employees with a job title of Software Developer, but only those who earn more than \$95,000. In this case, first select **Job Title**, then click **Add Field** and select **Salary**. Finally, define the search parameters as follows:

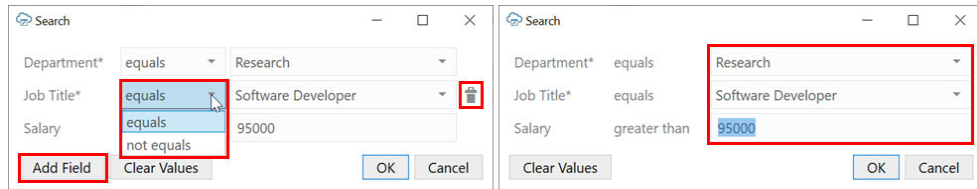


 **Note:**

When configuring your search, make sure the field your dynamic list of values is based on is added before the field with the dynamic list. So, to filter the Job Title list based on the Department value, add the Department field before the Job Title field in the Search Editor. See [Configure a Filter with a Dynamic Parameter](#).

5. Select **Editor enabled at download** to allow business users to edit the search when downloading data. Deselect this check box to provide a simplified Search prompt instead.

If this check box is selected, the business user can add and delete search fields as well as change search filters, as shown on the left:



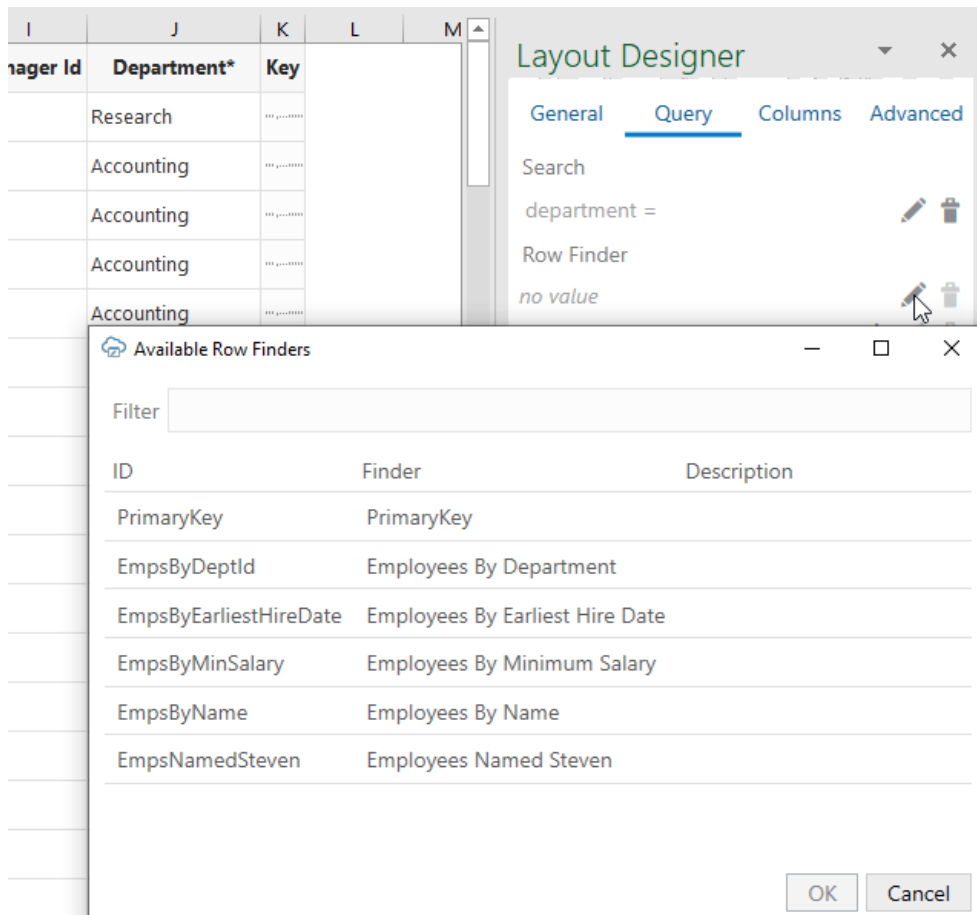
If the check box is unselected, only the values are editable, as shown on the right.

6. Click **OK**.

Use Row Finders to Limit Downloaded Data

For workbooks that integrate with Oracle business object REST API services, you may select one of the predefined row finders if any are associated with the layout's business object.

1. In the Excel ribbon, click **Designer**.
2. In the Layout Designer's Query tab, click the Edit icon next to the Row Finder property to see the row finders configured for the service in the Available Row Finders window:



For details on modifying how row finders appear in the add-in (including how to add titles and help text for row finders and variables), see [Configure Row Finders for a Business Object](#).

3. Select a row finder and click **OK**.
When you download data to your workbook, the row finder filters the data based on the filter criteria. If the row finder requires input from the user, you'll be prompted to provide a value for the row finder parameter.

For more information about configuring the Oracle business object REST API service that supports finders, refer to these resources in *Developing Fusion Web Applications with Oracle Application Development Framework*:

- [About RESTful Web Services and ADF Business Components](#)
- [Filtering a Resource Collection with a Row Finder](#)

Use Search Parameters to Limit Downloaded Data

Create a search query that determines which data get returned from the REST service when a business user invokes a download. For example, if a user only needs to access records for a specific location, you can create a query that includes a search parameter for that location.

For example, to retrieve employee items where the `managerId` field is empty, you would create a search on the **Employees** business object with a search parameter of "managerId is null". The GET request would then include the following in the query string portion of the URL:

```
GET.../Employees?q=managerId+is+null
```

where:

- `q` is a query parameter supported by the Employees service
- `managerId` is the name of a field that supports the query parameter
- `null` is the search value

When the user clicks the **Download Data** button, the add-in appends the search query to the REST endpoint URL of the GET request. If search or row finder settings have also been configured, the user is prompted to provide values for the configured parameters that will further filter the returned results.

Note:

The Search Parameters property works in combination with the other two properties (where applicable). They are not mutually exclusive. However, some combinations may work where others may not. If you choose to configure multiple search options, you must ensure that the service supports that combination.

For example, some services such as Oracle business object REST API services do not support using more than one "q" parameter in a REST call. If you define a "q" search parameter for a layout, it may not work if you already have a search defined using the Search Editor.

If the service supports complex searches, you can create complex searches in the layout, as shown in the following example:

```
q=((firstName LIKE '*es*') or ((hireDate< "2001-01-13") and (department = 10)))
```

Each service defines which parameters can be used for search. Likewise, each service defines the required and supported syntax for the expression that appears on the right-hand side of the assignment operator (=).

There is no validation in this editor or at download time. The add-in cannot determine which parameters are useful for search. Likewise, the add-in can't determine the proper syntax for the parameter values. If you enter invalid information, you may get a bad request error. Consult the API documentation for the service you are using to identify whether to use "q" for the parameter name and how to formulate the search expression properly.

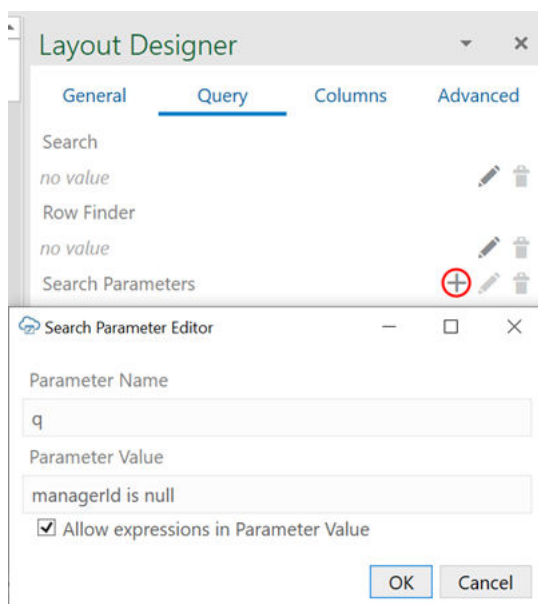
The add-in applies URL encoding to the parameter value at download time. Don't enter URL-encoded values. The search parameter name is not encoded.

 **Note:**

You can configure search parameters for each layout in a set of dependent layouts. See [Filter Data for a Set of Dependent Layouts](#).

To add search parameters to your layout:

1. In the Excel ribbon, click **Designer**.
2. In the Layout Designer's Query tab, click the Add or Edit Search Parameter icon next to the Search Parameters property to open the Search Parameter Editor where you add or edit search parameters.



 **Note:**

If you include an expression in the **Parameter Value** field, select **Allow expressions in Parameter Value** to ensure Oracle Visual Builder Add-in for Excel evaluates the value as an expression. See [About Expressions](#).

3. Click **OK** to close the editor.

 **Tip:**

To troubleshoot a particular combination of search settings, open the Network Monitor and download data. Then, inspect request details in the Network Monitor's window. This information may help you refine search settings.

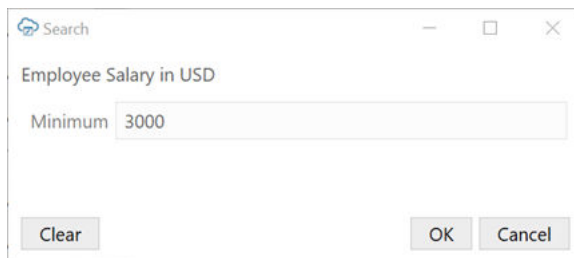
Download Behavior in Layouts that Use Search and Row Finders

If you assigned a Row Finder to the layout, the behavior of Oracle Visual Builder Add-in for Excel depends on the number of Row Finder Variables.

If there are no variables, there is no prompt. If the finder has one or more variables, a prompt appears that allows the user to specify values for each variable.

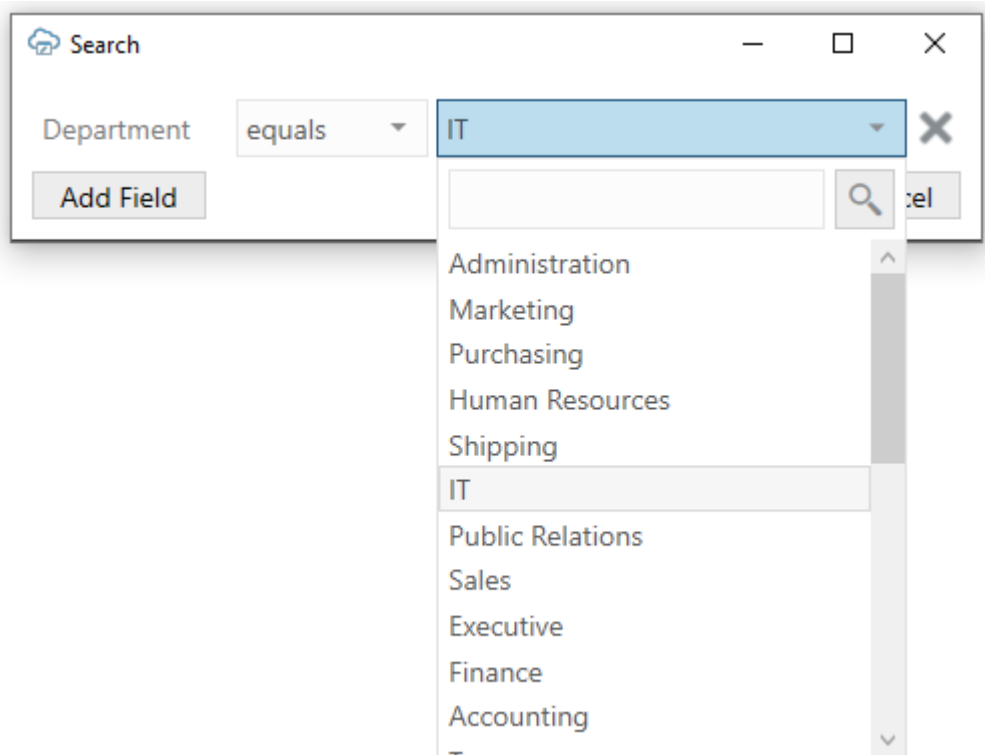
 **Note:**

Only Oracle business object REST API services support row finders.



The screenshot shows a standard Windows-style dialog box titled "Search". The main text inside the dialog is "Employee Salary in USD". Below this text is a text input field with the label "Minimum" and the value "3000". At the bottom of the dialog, there are three buttons: "Clear", "OK", and "Cancel". The dialog box has standard window controls (minimize, maximize, close) in the top right corner.

If you configured a search with the graphical search editor, the add-in displays that prompt next, as shown here:



7

Custom Actions

Oracle Visual Builder Add-in for Excel supports custom actions defined by Oracle business object REST API services.

A custom action is a function defined by the REST service that is callable by external systems using REST POST requests. A custom action may accept zero or more parameters of simple types such as a String or Integer and returns a single value to the add-in. When that value is a string or other scalar value, the add-in shows the result to the business user.

What a custom action does when invoked by the add-in is determined by the service. The add-in simply sends a POST on the collection or item path that includes the action name, such as `/contextRoot/v1/myBusObj/{itemId}/action/doMyAction` for a business object item.

This post can include payload field values, known as "parameters", to the service. The service then takes the passed parameters and performs the custom action. This action may act on a single row when defined at the row level. When the action is defined at the business object level, the REST service determines which rows, if any are affected.

Let's look at a couple of examples of custom actions at the business object (BO) level and BO item level. For example, a REST service may have a custom action defined at the BO level such as the one described [here](#) in *REST API for Oracle Fusion Cloud Project Management*. When triggered, this custom action reprocesses all the project budget versions which are showing as failed and brings these back into a working state.

Examples of custom actions at the BO item level might be a couple of custom actions, "Approve" and "Reject", that operate on the items of a expense report business object. A business user can download one or more expense reports, approve or reject each one, and then update them all in a single upload.

If a given REST API supports custom actions, they are described in the service's OpenAPI v3 service description document. The add-in can analyze this service description, harvest custom action definitions, and include them in the workbook's corresponding business objects. No further configuration is required. However, you may want to change the title and add help text for a better user experience.

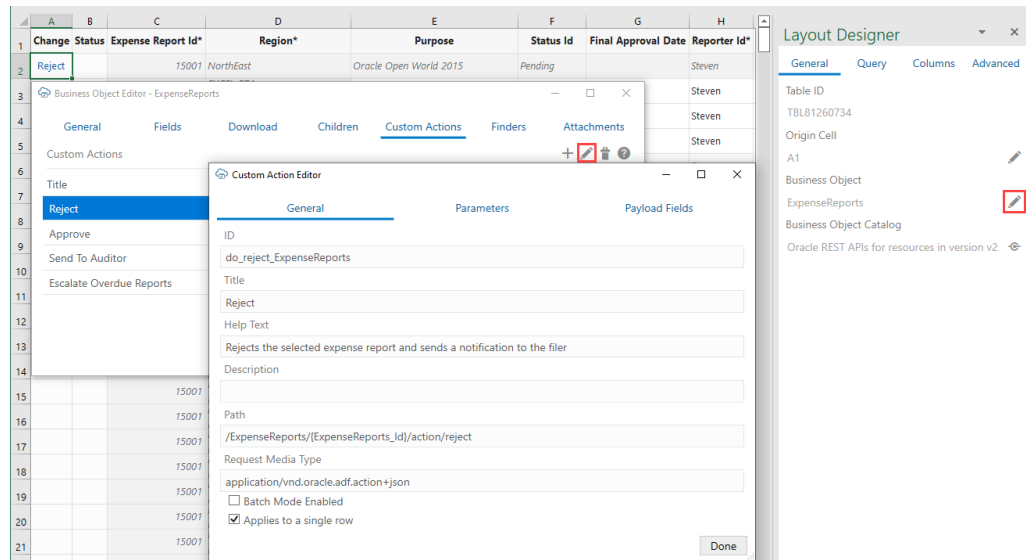
Business users perform custom actions using the buttons and menu commands from the Oracle Visual Builder ribbon tab. See Perform Custom Actions in Table and Form-over-Table Layouts in *Managing Data Using Oracle Visual Builder Add-in for Excel*.

Item level custom actions can be performed on items in either the form or the table of a Form-over-Table layout, as well as on rows in a Table layout. BO level custom actions can be performed on BOs in a Table layout and the form in a Form-over-Table layout. They are not supported on the BO in the table of a Form-over Table layout. See [Custom Action Limitations](#) for information on other custom action limitations.

Edit Custom Actions

Custom actions exposed by the service that your workbook uses can be viewed and edited in the **Custom Actions** tab of the Business Object Editor.

Oracle Visual Builder Add-in for Excel populates this editor with the custom action properties as described in the service's OpenAPI v3 service description document.



In this example, the add-in shows the properties for a "Reject" custom action on an ExpenseReports business object (BO) item path (`/ExpenseReports/{ExpenseReports_Id}/action/reject`). The **Applies to a single row** check box indicates that the custom action operates at the business object (BO) item level. If this check box is unselected, the custom action operates at the BO level.

Custom Action Properties

The **Title**, **Help Text**, and **Description** properties can be edited as needed in the Custom Action Editor. The other properties, **ID**, **Path**, and **Request Media Type**, reflect the service configuration and should be left as is.

- **Title:** The name of this custom action. Provide a short value that is meaningful to your business users. This value appears wherever business users can invoke the action. This value can be localized.
- **Help Text:** Provide a brief explanation of what the custom action does. This value appears near the title when possible. This value can be localized.
- **Description:** This is an internal technical description. This value only appears in the designer. It is not localizable.

Note:

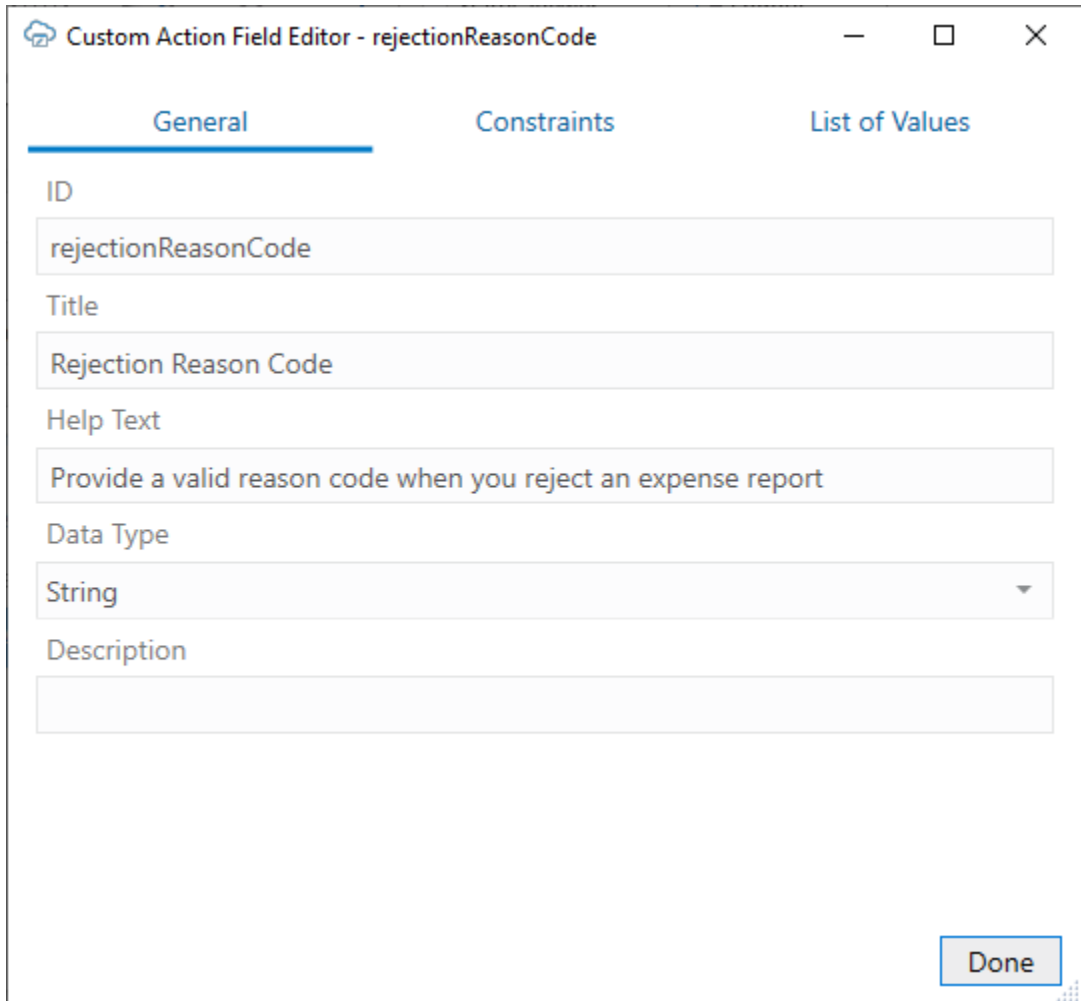
When the **Help Text** value is displayed to your business users, the label next to that value is "Description".

For information on the **Batch Mode Enabled** check box, refer to [Batch Mode for Custom Actions](#).

Payload Field Properties

Payload fields can be edited on the **Payload Fields** tab of the Custom Action Editor. Properties such as the **Title**, **Data Type**, and **Required** can be changed. For example, you can change the data type of a payload field from **String** to **Integer**, as long as the

change is compatible with the service. You can also update the **Required** property to mark the payload field as required or not:



The screenshot shows a dialog box titled "Custom Action Field Editor - rejectionReasonCode". It has three tabs: "General" (selected), "Constraints", and "List of Values". The "General" tab contains the following fields:

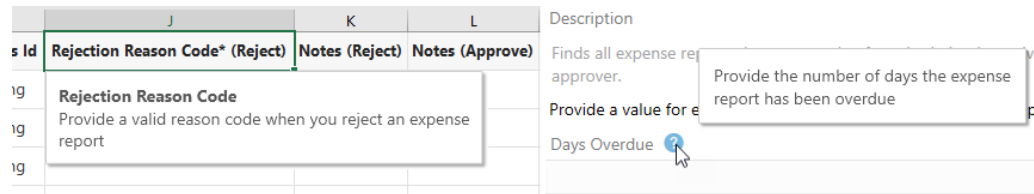
- ID:** rejectionReasonCode
- Title:** Rejection Reason Code
- Help Text:** Provide a valid reason code when you reject an expense report
- Data Type:** String
- Description:** (empty text area)

A "Done" button is located at the bottom right of the dialog.

As with the custom action, the **Title**, **Help Text**, and **Description** properties can be edited as needed in the Custom Action Field Editor. The other properties, **ID** and **Data Type** reflect the service configuration and should be left as is.

- **Title:** The name of this custom action field. Provide a short value that is meaningful to your business users. This value can be localized.
- **Help Text:** Provide a brief description of the custom action field. This value can be localized.
- **Description:** This is an internal technical description. This value only appears in the designer. It is not localizable.

For single row custom actions, this help text appears in a popup when the business user selects the column header for a payload field in a Table layout, as shown on the left in this image:



For BO-level custom actions, the help text appears in a popup when you hover over the help icon (?) next to a payload field in the Perform Action wizard, as shown on the right.

You can also configure a payload field with a custom field validation rule as well as a list of values. See [About Custom Field Validation Rules](#) and [Configure a List of Values with a Business Object](#).

Add Custom Action Fields to a Table Layout

If the service your workbook uses includes custom actions on individual items of a business object, you can add defined custom action payload fields to your Table layout or the table part of your Form-over-Table layout.

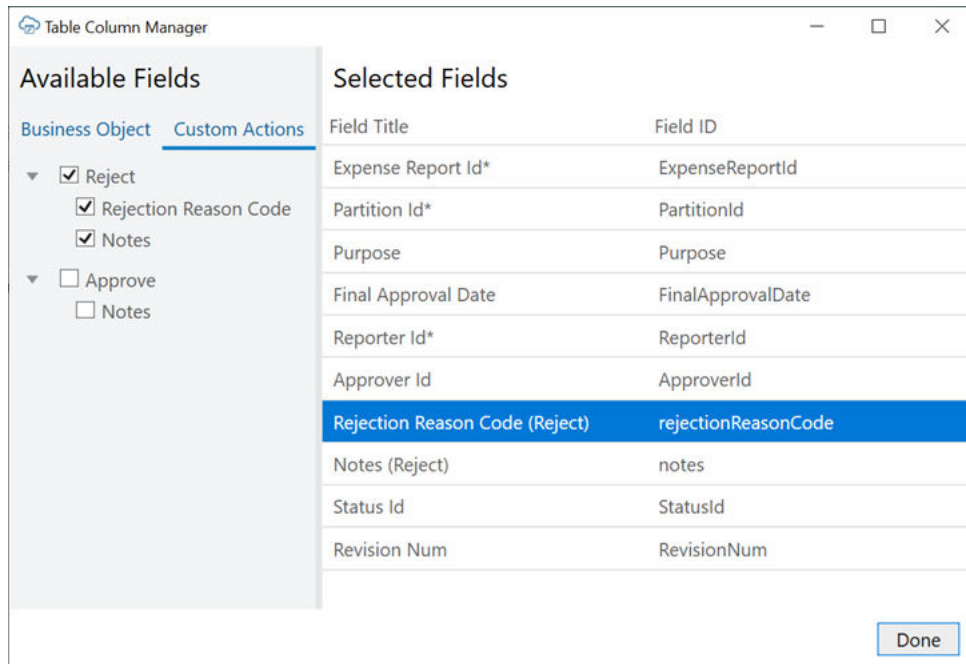
Let's take as an example a "reject" custom action that's exposed by an expense report business object to reject expenses.

This task assumes you have a Table layout for an expense report business object that includes a "reject" custom action. You can also add custom actions to the table of a Form-over-Table layout.

To add custom action table columns to a layout:

1. Select the layout, then click **Designer** from the Oracle Visual Builder tab to open the Layout Designer.
2. Click the **Columns** tab in the Layout Designer.
3. Click Manage Columns (+) to open the **Table Column Manager**.
4. From the **Table Column Manager**, click **Custom Actions** in the **Available Fields** pane.
5. In the **Selected Fields** pane, select the location where you want the payload field columns to be added. The columns will be inserted before the selected field.
6. In the **Available Fields** pane, select the payload fields you want to add.

In this example, we'll select **Reason** and **Notes** to add these columns to the layout.



7. Click **Done**.

Once you add custom action fields to a layout in your integrated workbook, your business users can mark rows for the custom action by entering values in the payload field columns or by using the ribbon command. See Perform Custom Actions in Table and Form-over-Table Layouts in *Managing Data Using Oracle Visual Builder Add-in for Excel*.

When they click **Upload Changes**, Oracle Visual Builder Add-in for Excel sends their changes to the REST endpoint and invokes the custom action on the marked rows.

Service Description for Custom Actions

If a given REST API supports custom actions, they are described in the OpenAPI v3 service description document generated by the Oracle business object REST API service. For example, a `reject` item-level custom action would appear in the `paths` collection:

```
// Note: some JSON content has been omitted for brevity/clarity

"/ExpenseReports/{ExpenseReports_Id}/action/reject": {
  "parameters": [
    {
      "$ref": "#/components/parameters/ExpenseReports_Id"
    }
  ],
  "post": {
    "summary": "reject",
    "description": "reject",
    "operationId": "do_reject_ExpenseReports",
    "responses": {
      "default": {
        "description": "The following table describes the default response
for this task.",
```

```

        "content": {
          "application/vnd.oracle.adf.actionresult+json": {
            "schema": {
              "type": "object",
              "properties": {
                "result": {
                  "type": "string"
                }
              },
              "required": [
                "result"
              ],
              "additionalProperties": false
            }
          }
        },
        "requestBody": {
          "description": "The following table describes the body parameters in the request for this task.",
          "content": {
            "application/vnd.oracle.adf.action+json": {
              "schema": {
                "type": "object",
                "properties": {
                  "rejectionReasonCode": {
                    "type": "string",
                    "nullable": true
                  },
                  "notes": {
                    "type": "string",
                    "nullable": true
                  }
                },
                "additionalProperties": false
              }
            }
          }
        }
      }
    }
  }
}

```

Note the following:

- For a item-level custom action, the path entry contains a path parameter for the row/item ID, for example, `/ExpenseReports/{ExpenseReports_Id}/action/reject`
In the case of a business object-level custom action, the path (such as `/ExpenseReports/action/sendToAuditor`) doesn't include a path parameter for the row/item.
- The end of the path entry (`reject`) matches the name of the custom method defined in the service (see Publishing Custom Service Methods to UI Clients)
- The presence of a POST operation for the action path entry is required

- In the `requestBody` schema, there are properties that match the parameters defined in the custom method signature from the service. In this document, these properties are referred to as custom action payload fields.

Batch Mode for Custom Actions

If a custom action supports batch mode, Oracle Visual Builder Add-in for Excel can process custom actions and other types of changes in batches.

Batch mode is only relevant for custom actions defined on the item path since custom actions on individual items are sent as separate requests. A custom action on an entire business object may update multiple items in the business object but is accomplished using a single request.

To enable the add-in to process changes in batches, select the **Batch Mode Enabled** check box in the Custom Action Editor. If the check box is not selected, the add-in invokes the custom action one row at a time.

If you attempt to use batch processing on a custom action that does not support it, you may get an error from the service. If the custom action doesn't work properly in batches, deselect the check box to disable batch processing.

For more information, see [Upload Changes Using Batch Requests](#).

Note:

The `"batchEnabled" : false` property in the service description only determines the default value of the **Batch Mode Enabled** check box in the Custom Action Editor. If the property is not configured, the **Batch Mode Enabled** check box is selected by default.

After the catalog is created, the check box setting controls how the add-in behaves.

Custom Action Limitations

Here are some things to keep in mind when using custom actions:

- Custom actions are not supported for pending Create rows or form in Create mode.
- Custom actions defined in the OpenAPI 3 service description document that have request payload schema members that match business object fields are unlikely to function properly.
- Oracle business object REST API service OpenAPI 3 service descriptions do not indicate which custom action request payload fields are required. You can use the Business Object Editor to adjust the **Required** property on payload fields. See [Edit Custom Actions](#).
- Oracle business object REST API services do not return the updated row. As a result, you need to download before making further changes.
- The results of custom actions that return complex object values for the "result" member in the JSON response payload are not shown in the Status Viewer.

8

Use Lists of Values in an Excel Workbook

You can configure a **list of values** (LOV) for a field in your workbook to allow business users to select a valid value from a drop-down list. You can also allow users to enter a search term in a search box to filter this list to find the value they want.

Oracle Visual Builder Add-in for Excel supports LOVs on business object fields including custom action payload fields and descriptive flexfields with parameter and segment type client binds. The add-in also supports lists of values for search fields and row finder variables.

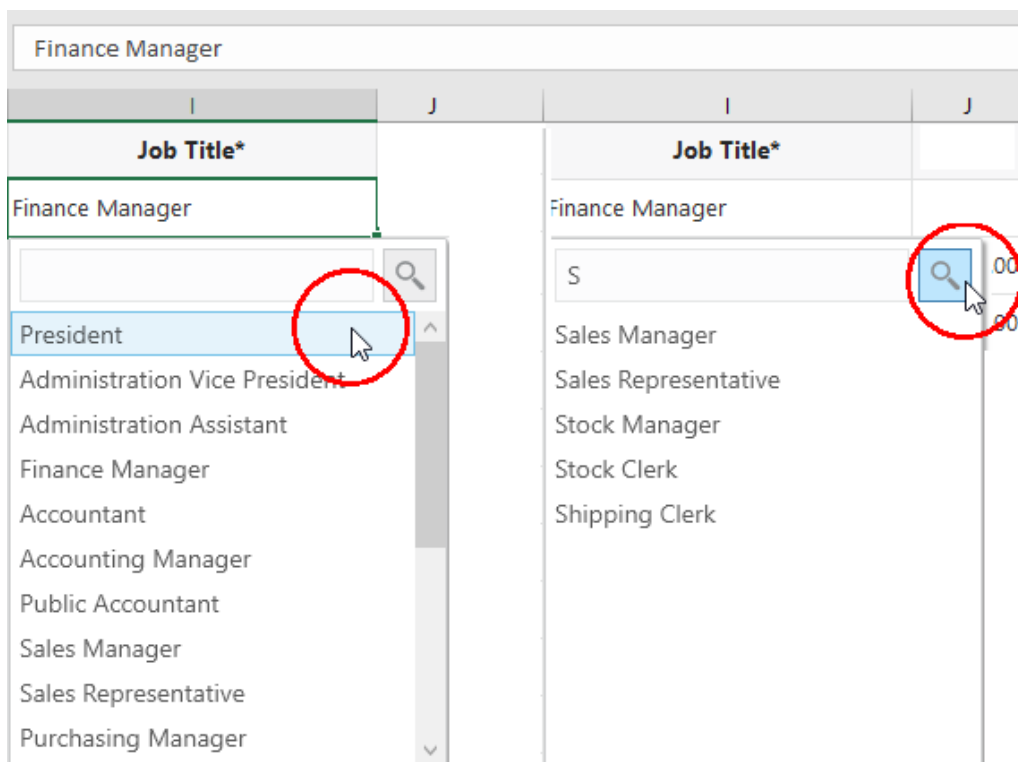
Lists of values also manage the conversion of internal ID or code values to and from user-friendly display values.

About Lists of Values

When you configure a list of values in your workbook, Oracle Visual Builder Add-in for Excel displays a drop down list of values when a business user selects the field.

If a filter with a search term parameter is configured, a business user can also search for values in the list by typing a search term in the search-and-select window and clicking the **Search** icon.

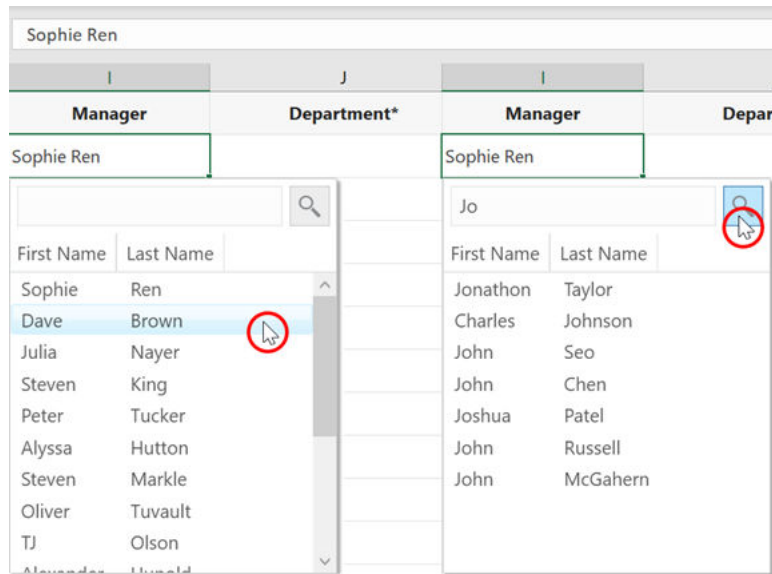
In this image, the search-and-select window on the left is populated with a list of values drawn from a Jobs business object. The search-and-select window on the right shows the result of entering **s** in the search box and clicking the **Search** icon.



When a business user clicks the **Search** icon, the list of values displays only job titles that begin with **S** such as "Sales Manager", "Sales Representative", and so on. Business users can also enter the full value in the search box, assuming it's a valid value such as "Sales Manager".

Lists of values can also be configured to show more than one display field in the search-and-select window. The add-in shows all the display fields, in separate columns, in the search-and-select window but concatenates those values configured for display when shown in the Excel cell.

In this image, the search-and-select window on the left shows separate columns for first and last names. The search-and-select window on the right shows the result of entering **JO** in the search box and clicking the **Search** icon.



The list of values displays all first or last names that match the string. In this example, the add-in matches the search string "Jo" to the first name "Joshua" but also the last name "Johnson".

Each item in the list of values has a **display** value (which appears in the Excel workbook) and an **identity** value that is retrieved and posted to the business object field. For example, the Jobs business object used for the list of values might contain these display and identity values:

Display value (jobTitle)	Identity value (jobId)
President	PRES
Finance Manager	FIN_MGR
Sales Manager	SAL_MGR

On download, the identity values are replaced by the display values; On upload, the display values are replaced by the identity values.

Configure a List of Values with a Business Object

Configure a list of values that uses values from another business object. List of values are supported for business object fields, custom action payload fields, and row finder variables.

When you create a list of values, you can associate the selected field with the values from another business object. For example, you may have two business objects: Employees and Jobs. If the Employees layout includes a JobId column, you may want to add a list of values that references the `jobId` field from the Jobs business object.

When a business user selects a cell from the Job Title column in the Employees layout, a search-and-select window shows a list of values drawn from the Jobs business object for the user to choose from.

You can configure a list of values to show more than one display field in the search-and-select window. The add-in shows all the display fields, in separate columns, in the search-and-select window but only those you configure are shown in the Excel cell. If you choose to show more than one field in the cell, the values are concatenated.

For business object sources, you can configure a filter to restrict the results to a given subset of values. You can also configure it to let business users filter the list based on a search term they type in a search box. See [Configure a Filter for a List of Values](#).

If the catalog is missing the desired business object, you can add a new business object to an existing catalog (see [Add Business Objects to an Existing Catalog](#)).



If you want to reference a business object with a different base path, you can create or import a business object into the current catalog and then override the base path (see [Override a Business Object's Base Path](#)).

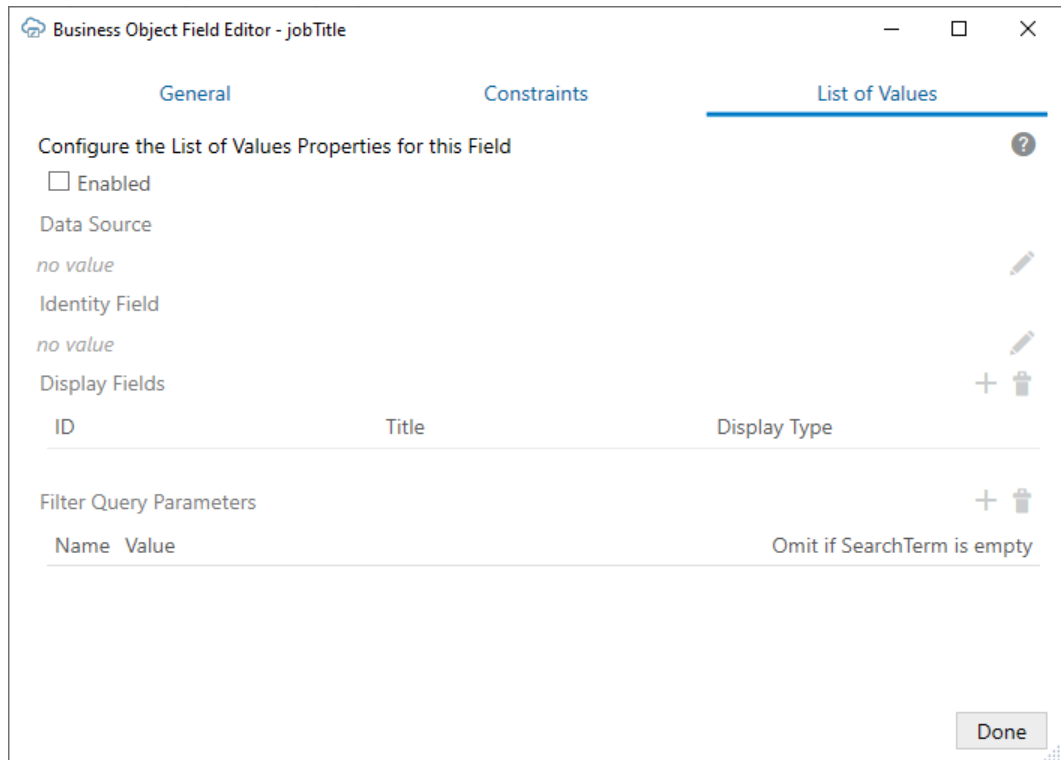
 **Note:**

This procedure takes you through the steps to create a list of values for a business object field used in a form, table, or search. The steps are the same for custom action payload fields and row finder variables except for the navigation. To open the List of Values page for a custom action payload field or row finder variable, open the Business Object Editor and go to the **Custom Action** or **Row Finder** page. From there, select the appropriate field or variable.

To create a list of values based on a local data source instead, see [Configure a List of Values with a Local Data Source](#).

To create a list of values:

1. From the Layout Designer, click the **Edit** () icon next to the Business Object field.
2. From the Business Object Editor, click the **Fields** tab, then select the business object's field.
3. Click the **Edit** () icon to open the Business Object Field Editor, then click the **List of Values** tab.



4. Select the **Enabled** check box on the **List of Values** page.
5. Click the **Edit** (✎) icon next to the **Data Source** field, then pick an appropriate data source. If using a business object, make sure it is from the same catalog used to create the layout.
This data source provides the display values for the corresponding identity values.
6. Click the **Edit** (✎) icon next to the **Identity Field** field, then choose the appropriate identity field from the data source.
This is the field used to look up the display values for the identity values in the current field.
7. Click the **Add Field** (+) icon to open the **Available Business Object Fields Editor**, then choose the desired display field.
These fields come from the data source and are shown instead of the identity values where this field is used in a layout.
You can choose multiple display fields for one list of values. Repeat this step to add additional display values.
8. For each display field, select either **Picker and cell** or **Picker only** from the **Display Type** list.
If you configured only one display field, use **Picker and cell** to display the value in both the Excel cell and the search-and-select window. For additional display fields, use **Picker only** if you don't want to display the value in the Excel cell.

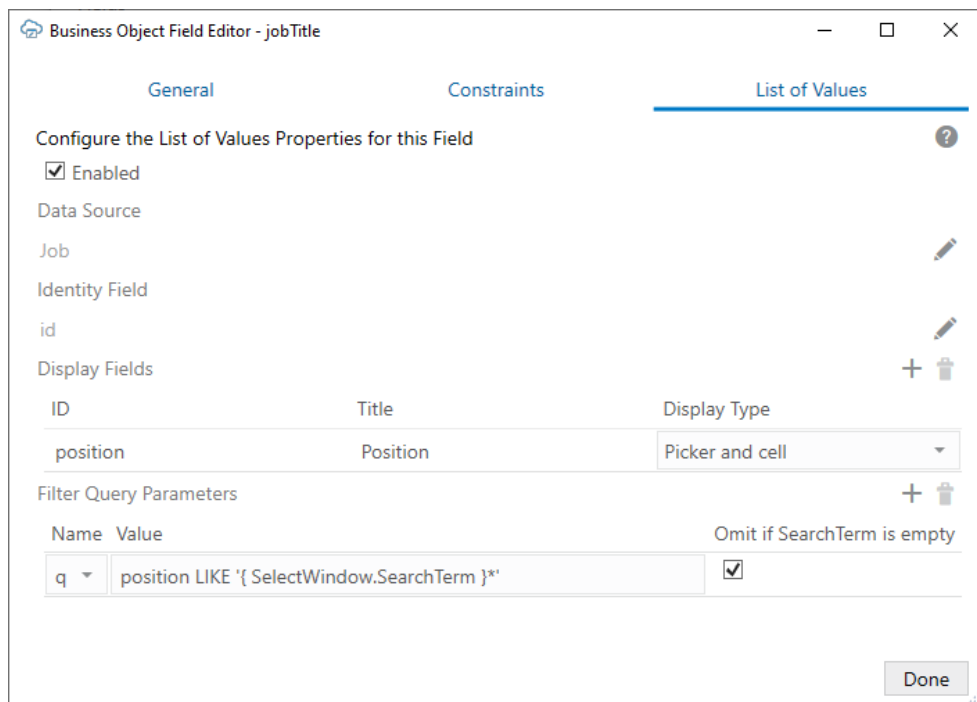
 **Note:**

When configuring the display values, make sure the information in the cell is unique and meaningful for your business users. Take for example a Contact field in your layout. To ensure your business users have enough information to determine the right contact for a purchase order, you may want to include the contact name, company, and email as display fields in the Excel cell. In this case, ensure that the display type for these display fields are set to **Picker and cell**.

9. To configure a filter, click the **Add Query Parameter (+)** icon next to Filter Query Parameters, then set a name and parameter value. If the parameter requires a search term, click **Omit if SearchTerm is empty**.

Repeat this step to create additional parameters.

In this image, a list of values is configured for the jobTitle field that is populated with values from the position field of the Job business object. A filter query parameter has been configured that allows a business user to return positions that start with the business user's search term.



10. Click **Done**.

Once you define a list of values, the choice list will appear wherever that business object or payload field appears. For the row finder variable, the choice list will appear wherever that row finder variable appears during download.

The add-in [caches the data of list of values](#) in the workbook. After you modify the configuration of any list of values, click **Clear List of Values Cache** from the **Advanced** menu.

Configure a Filter for a List of Values

Configure a filter for your list of values to determine which items from the business object used as the data source are included in the list. A filter is a set of one or more URL query parameters that are appended to a REST request to the referenced business object.

Filters are not available for lists of values that use a local data source.

The filter query parameters are added to all requests to the referenced business object. These include the request to fetch the initial set of values as well as the one sent when the business user clicks the **Search** icon after entering a search term.

You should always configure a filter with a search term parameter since the search option is always available to the business user.

There are a few basic filter scenarios you may want to consider when configuring a list of values:

- **Search term parameter only:** You don't need to use a filter parameter for the initial set of values if you want your business users to access all values from the referenced business object. In this case, just configure a search term parameter and let your business user filter the list based on a search term. See [Configure a Filter for a Search Term Only](#).
- **Filter and search term parameters:** To limit the choices available from the referenced business object, consider using a filter parameter such as a finder. Also, add a search term parameter to let your business user search from within the list. See [Configure a Filter to Limit Available Choices](#).
- **Dynamic and search term parameters:** A dynamic filter parameter limits the number of values in a list of values based on a field value in the current layout or search box. For example, you may filter a Job Title list of values based on the selected employee's department so that only job titles for this department are displayed. See [Configure a Filter with a Dynamic Parameter](#).
- **Cascading lists of values:** A cascading list of values uses dynamic filters where the value selected in one list determines the range of values that users can select from subsequent lists. See [Configure a Cascading List of Values](#).

See [About Expressions](#) for more information about expressions in lists of values.

Consult the API documentation for your service to determine the appropriate search syntax to use in the Value column. For example, if you use an Oracle business object REST API service, consult Understanding Framework Support for Query Syntax in *Accessing Business Objects Using REST APIs*.

Configure a Filter for a Search Term Only

Configure a filter with a search term parameter to allow your business users to search for values using a search term.

For example, let's say you have a list of values that displays job titles for your company. To allow the business user to filter this list, you can use a "q" parameter value to return job titles that start with the business user's search term:

Filter Query Parameters		+
Name	Value	Omit if SearchTerm is empty
q	jobTitle LIKE '{ SelectWindow.SearchTerm }**'	<input checked="" type="checkbox"/>



Note:

Select **Omit if SearchTerm is empty** to ensure this parameter is only applied when there is a value in the search box.

In this example, a business user can type "ma" in the search box and click the **Search** icon to display job titles such as "Manager" and "Marketing Specialist".

You should always configure a search term parameter for your filter since the search option is always available to your business users.

If you have more than one display field in your list of values, you can use the "OR" operand to search on each of the fields. For example, to match text to either the employee's first or last name, create a parameter like this:

Filter Query Parameters		+
Name	Value	Omit if SearchTerm is empty
q	firstName LIKE '{ SelectWindow.SearchTerm }*' OR lastName LIKE '{ SelectWindow.SearchTerm }**'	<input checked="" type="checkbox"/>

When a user types in the search box and clicks the **Search** icon, the add-in displays all first or last names that match the string. In this example, the add-in would match the search string "Jo" to the first name "Joshua" but also the last name "Johnson".



Note:

The syntax for the filter query varies based on the REST service type and expected query syntax for a business object.

Configure a Filter to Limit Available Choices

Configure a filter with multiple query parameters to limit the choices that are fetched from the referenced business object.

For example, you may have a referenced business object that stores values for a number of different lists of values and you need a way to retrieve only the values for the current field.

Let's consider a business object, `StandardLookupsLOV`, that stores immigration details for a company's employees such as immigration status (`I_Status`) and type (`I_Type`).

You may want to use a finder, for example, to return just the immigration status (`I_Status`) values, such as "Not Applicable", "Pending", "Accepted" and so on, for your list of values.

You'll also want to create a search term parameter to allow your business users to find the value they are looking for.

To do this, configure your filter as shown here:

Filter Query Parameters			+
Name	Value	Omit if SearchTerm is empty	
finder	LookupTypeFinder;LookupType=I_Status	<input type="checkbox"/>	
q	DisplayValue LIKE '{ SelectWindow.SearchTerm }**'	<input checked="" type="checkbox"/>	
orderBy	DisplayValue	<input type="checkbox"/>	

In this case, the initial set of values is determined by the finder configuration. If the business user types a search term and clicks the **Search** icon, the list is further limited to status values whose `DisplayValue` starts with the search term.

Configure a Filter with a Dynamic Parameter

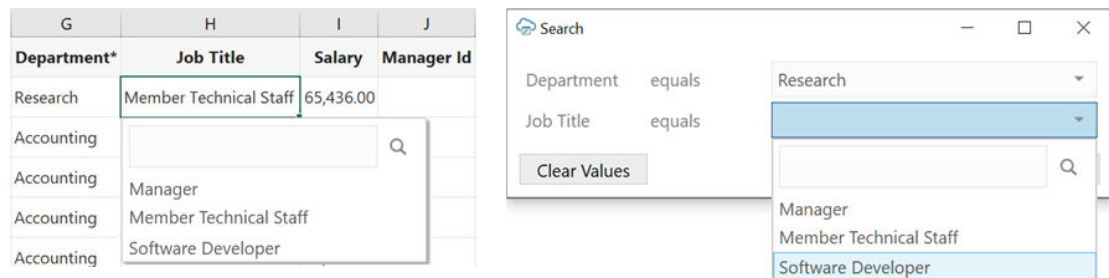
You can configure a list of values that is dynamically filtered based on another value in a layout, search field, or row finder variable. To do this, configure a filter for your list of values that uses an expression that references another business object field or row finder variable.

Referencing Business Object Fields in a Dynamic Filter

Let's say you have a Table layout for an Employees business object that includes two columns: "Department" and "Job Title". You may want to configure a list of values on the Job Title column that includes a filter that filters the list based on the value in the Department cell in the same row. When configured, your business users will see only those job titles that are relevant for the department that they have selected.

Of course, you can also use these fields in a search. Again, when a business user selects a department, Oracle Visual Builder Add-in for Excel shows only relevant job titles in the Job Title field.

As you can see on the left in this image, the list of values (in this example, "Job Title") is based on the value of another field ("Department"). When used in a search as shown on the right, the Job Title list is filtered based on the value in the first search field ("Department").



To configure a dynamic filter for the Job Title list, use a parameter that filters based on the department Id. If you have a row finder that filters job titles by department, you can use an expression like this:

Filter Query Parameters			+
Name	Value	Omit if SearchTerm is empty	
finder	ByDeptFinder;DepartmentId={ this.BusinessObject.Fields['DepartmentId'].Value }	<input type="checkbox"/>	
q	jobTitle LIKE '{ SelectWindow.SearchTerm }*'	<input checked="" type="checkbox"/>	

The expression in the form, `{ this.BusinessObject.Fields['FieldId'].Value }`, where *FieldId* is the ID property of another field in the current business object or search—in this case, `DepartmentId`.

Since this expression refers to another field in the currently selected row or search, make sure this field ("DepartmentId", in this case) has been added to your layout or added before the field with the dynamic filter when it is used in a search. See [Use Search to Find Required Data](#) for information about how to use these lists of values in a search.

The Oracle Visual Builder Add-in for Excel replaces this expression with the corresponding field value (specifically, the identity value) when sending the request for the referenced business object's list of values. When business users select the Job Title field for an employee in the marketing department, the list includes only job titles associated with Marketing.

Likewise when using a dynamic list of values in a search. When business users select the Job Title field, the list includes only job titles associated with the department they first chose from the Department field.

If the corresponding field value is missing or invalid, the expression evaluation fails and an error is reported.

Tip:

Remember to include a search term parameter, such as `jobTitle LIKE '{ SelectWindow.SearchTerm }*'` , to allow your business users to filter the list to jobs based on a search term they provide.

Referencing Ancestor Business Object Fields in a Dynamic Filter

For a list of values that you plan to use in a layout, you can also refer to a parent or higher ("ancestor") business object in your expression using one or more `Parent` terms. For example, to create a list of values that refers to a field in the parent business object, you would use

```
ByDeptFinder;DepartmentId={ this.BusinessObject.Parent.Fields['DepartmentId'].Value }.
```

To refer to a grandparent business object, use two `Parent` terms instead:

```
this.BusinessObject.Parent.Parent.Fields['DepartmentId'].Value.
```

Note:

Do not refer to an ancestor business object if you plan to use your list of values in a search. Such a configuration will result in an error at runtime.

 **Tip:**

When using a dynamic filter in a layout, it is recommended that you add an ancestor column for the field ("DepartmentId", in this case) to the current layout. The ancestor field must be positioned *before the column ("Job Title") that references it*. This makes it easier for the add-in to find the correct value during runtime and improves performance.

If there is no matching ancestor column in the current layout, the add-in uses other ancestor columns to map the current row to its parent row. It repeats this process until it finds the ancestor row and reads the field value. This can take some time if there are a large number of parent rows. See [Add a Parent Column to Support Row Creation](#).

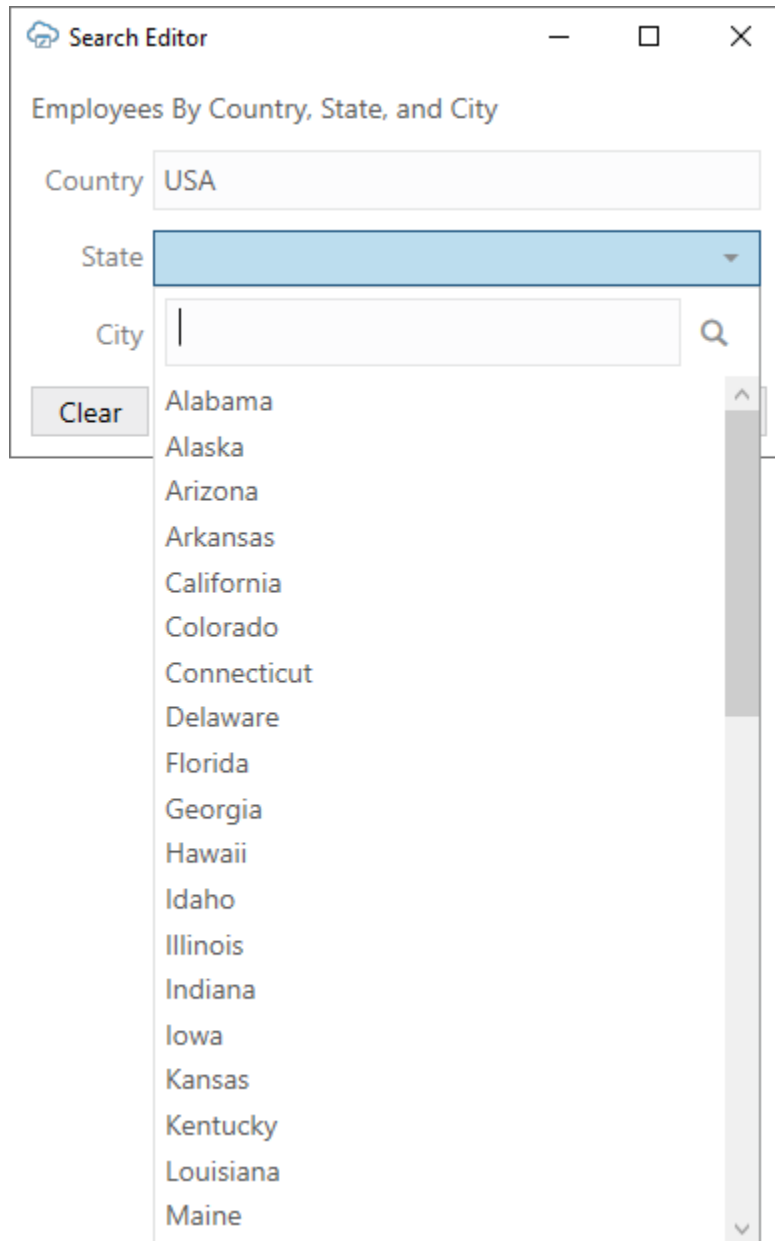
Referencing Row Finder Variables in a Dynamic Filter

Just as you do for a business object field, you can also define a list of values on a row finder variable and use it in a search. Like our business object field example, you can also define a parameter that filters the list of values based on the value selected from another variable in the same row finder.

Consider a row finder, "Employees By Country, State, and City", that filters employees by country, state, and city. This row finder includes three row finder variables: **CountryId**, **StateId**, and **CityId**.

You may want to configure lists of values on the each of these variables. For the first one, **CountryId**, you don't need a dynamic parameter. But for the other two, you would want to configure a parameter that filters the list of values based on the value selected in the previous variable. So, the values in the **StateId** variable would be based on the value of **CountryId** and those of the **CityId** variable would be based on the value of **StateId**.

Here's how this would look when configured:



In this image, the Search Editor uses our sample row finder and includes three fields for the row finder variables. The list of values in the **State** field is filtered based on the value entered in the **Country** field. In this case, the business user has selected "USA" from the **Country** list, and so the add-in is displaying only US states in the **State** list.

To configure a list of values on the **StateId** row finder variable, use a States business object as your data source, then define a "q" query that filters based on the value in **CountryId** variable, like this:

Filter Query Parameters			+
Name	Value	Omit if SearchTerm is empty	
q	CountryId={ this.Finder.Variables['CountryId'].Value }	<input type="checkbox"/>	
q	Name LIKE '{ SelectWindow.SearchTerm }*'	<input checked="" type="checkbox"/>	

The first filter parameter uses the expression, `CountryId={ this.Finder.Variables['CountryId'].Value }`, where:

- `this` represents the currently selected row finder variable (**StateId**, in our example);
- `Finder` is the row finder to which this finder variable belongs (**EmployeesByCountryStateCity**);
- `Variables['CountryId']` is the finder variable (**CountryId**) whose value determines the available choices of the current finder variable; and
- `Value` is the value of the field.

This expression sets the value of the variable, `CountryId`, used in the `q` query to the value of the **CountryId** row finder variable—"USA" in our example. See [About Expressions](#).

This value is then used to filter values from the States business object and populate the list of values with just US states.

Note:

A finder variable can only depend on the values of variables from the same finder. It cannot depend on values from the Form-over-Table or Table layout.

To use the row finder in a download filter, use the row finder as part of a search as described in [Use Row Finders to Limit Downloaded Data](#). When configured, the business user will see the Search Editor when they click **Download Data** where they can select values for each finder variable.

Tip:

By default, row finder variables are added to the Search Editor in the alphabetical order (**City**, **Country**, and **State** in our example). For a better user experience, consider changing the order so that the dependent ones appear after those they depend on (**Country**, **State**, and **City**).

Configure a Cascading List of Values

Just as you configure a single list of values with a dynamic parameter, you can also configure a **cascading list of values** of two or more lists using dynamic parameters. In a cascading list of values, the value selected in one list determines the range of values in the next list, and so on.

Let's suppose you have an Employees layout with three columns to capture an employee's location: Country, State, and City. To make sure only appropriate values are entered for an

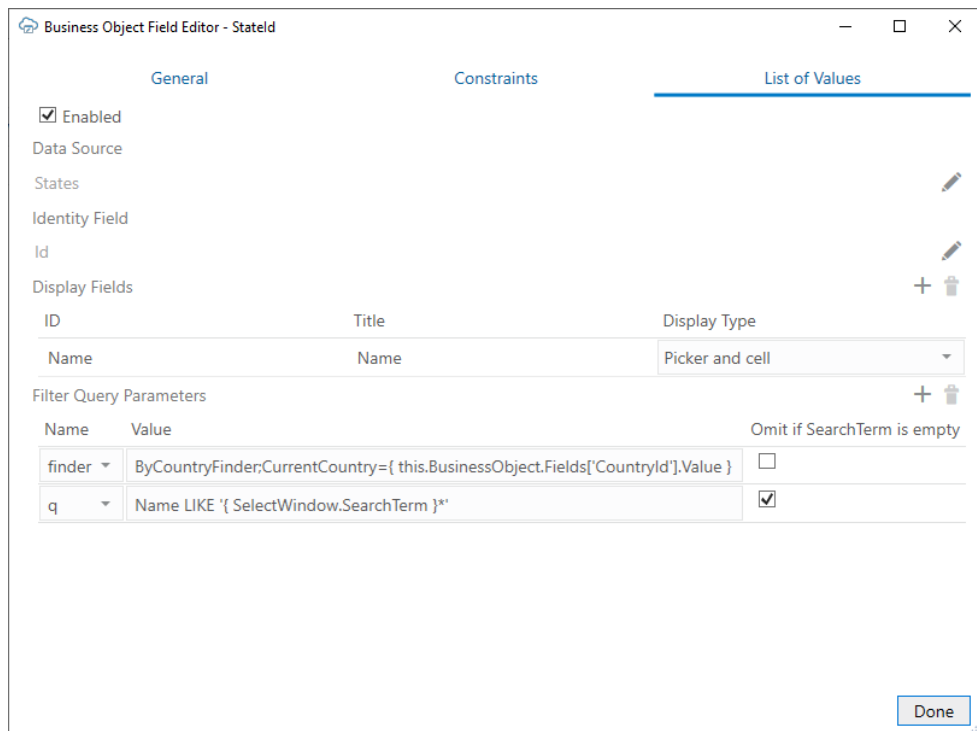
employee, you decide to use dynamic parameters to filter the State list of values based on the Country value, and the City list of values based on the Country and State.

 **Note:**

Keep in mind that you can define dynamic parameters on business object fields used in a layout or search, as well as on row finder variables. The principle is the same when you define parameters for a cascading list of values but, in this scenario, you create additional lists of values each one dependent on the previous one(s). For more information about dynamic parameters, see [Configure a Filter with a Dynamic Parameter](#).

Here's how you configure the lists of values to do this:

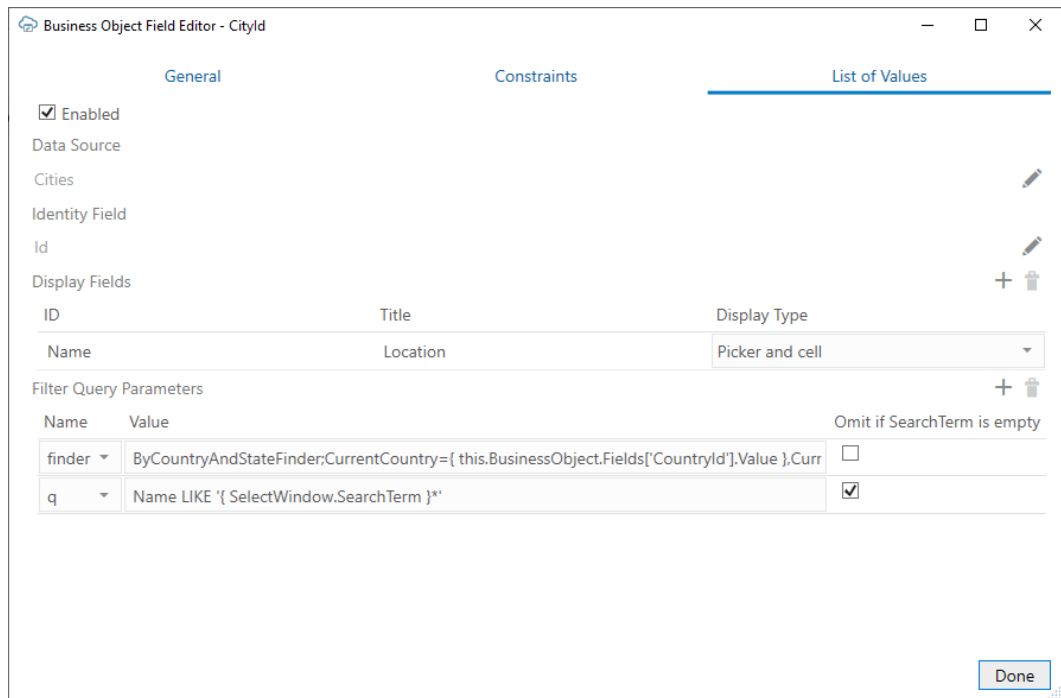
1. Start by creating a list of values for the first field, "CountryId", with just a search term filter (Name LIKE '{ SelectWindow.SearchTerm }*'). See [Configure a Filter for a Search Term Only](#). This filter allows the business user to type in the CountryId field to find the country they want.
2. Then, create a list of values for the second field, "StateId", that filters the list of values by the current country, as shown in this image:



This example uses a finder query, "ByCountryFinder", that filters based on the value in the **CountryId** field in the row. If the business user selects "USA" from the **CountryId** list, Oracle Visual Builder Add-in for Excel displays only US states in the **StateId** list.

As with the first list of values, this list also includes a search term filter so that the business user can type in the field to find the state they want.

3. Finally, create a list of values on the third field, "CityId", and filter the list of values by CountryId and StateId, as shown in this image:



This example uses another finder query, "ByCountryAndStateFinder", that filters based on the values in both the **CountryId** and **StateId** field in the same row. Now, if the business user selects "California" from the **StateId** list, the add-in displays only cities in California in the **CityId** list.

In a scenario like this with three fields ("fieldA", "fieldB", and "fieldC"), remember that fieldC depends on both fieldB and fieldA. So when you create the filter for fieldC's list of values, also include fieldA's value expression. In general, all of fieldB's dependencies must also be fieldC's dependencies.

Note the following name-value parameters under Filter Query Parameters:

Table 8-1 Example Name-Value Parameters in Filter

Field	Name	Value
StateId	finder	ByCountryFinder;CurrentCountry={ this.BusinessObject.Fields['CountryId'].Value }
CityId	finder	ByCountryAndStateFinder;CurrentCountry={ this.BusinessObject.Fields['CountryId'].Value },CurrentState={ this.BusinessObject.Fields['StateId'].Value }

4. If you need to add business object fields to your layout, you can open the appropriate tab in the Layout Designer, then click the Manage Form Fields or Manage Columns button (+) to add and reorder fields. For a Form-Over-Table layout, open the **Form** or **Table** tab. For a Table layout, open the **Columns** tab.



Note:

If the service has complete metadata for a cascading list of values, the filter query parameters of the corresponding field's list of values is automatically configured.

If the service does not have complete metadata for a list of values but you know it supports search syntax that makes for a cascading list of values, you can manually configure a list of values by adding filter query parameters. See [Configure a Filter for a List of Values](#).

Notes on Filters

Refer to these notes when configuring filters for lists of values:

- Oracle Visual Builder Add-in for Excel does not validate your filter configuration. If you provide invalid information, the add-in will make invalid requests that return errors.
- The query parameters are applied in the order that they are configured.
- The add-in applies URL encoding to the final resolved value of each filter query parameter before sending the request.
- Expressions like `{ this.BusinessObject.Fields['FieldId'].Value }` can't be used in the filter for:
 - Row finder variable's list of values
 - Custom action payload fields if the field referred to is not added to the layout
- If your list of values includes more than one display field, you can configure a search query that returns matches from any of the display fields. See [Configure a Filter for a Search Term Only](#) for an example of a search term parameter that includes the OR operand.
- If you configure multiple values with the same parameter name, the last value that is not "omitted" (**Omit if SearchTerm is empty** is enabled) is used by default. For example, in this filter configuration, the first query parameter is used *if there is no search term*; the second parameter is used *if there is a search term*.

Filter Query Parameters			+
Name	Value		Omit if SearchTerm is empty
q	DepartmentId={ this.BusinessObject.Fields['DepartmentId'].Value }		<input type="checkbox"/>
q	DepartmentId={ this.BusinessObject.Fields['DepartmentId'].Value } AND FirstName LIKE '{ SelectWindow.SearchTerm }'		<input checked="" type="checkbox"/>

- Filters are not available for list of values based on local data sources

Create a Local Data Source for a List of Values

You can create local data source that provides the values for the list of values (LOV). This data source stores these values in your integrated workbook as a set of name-value pairs.

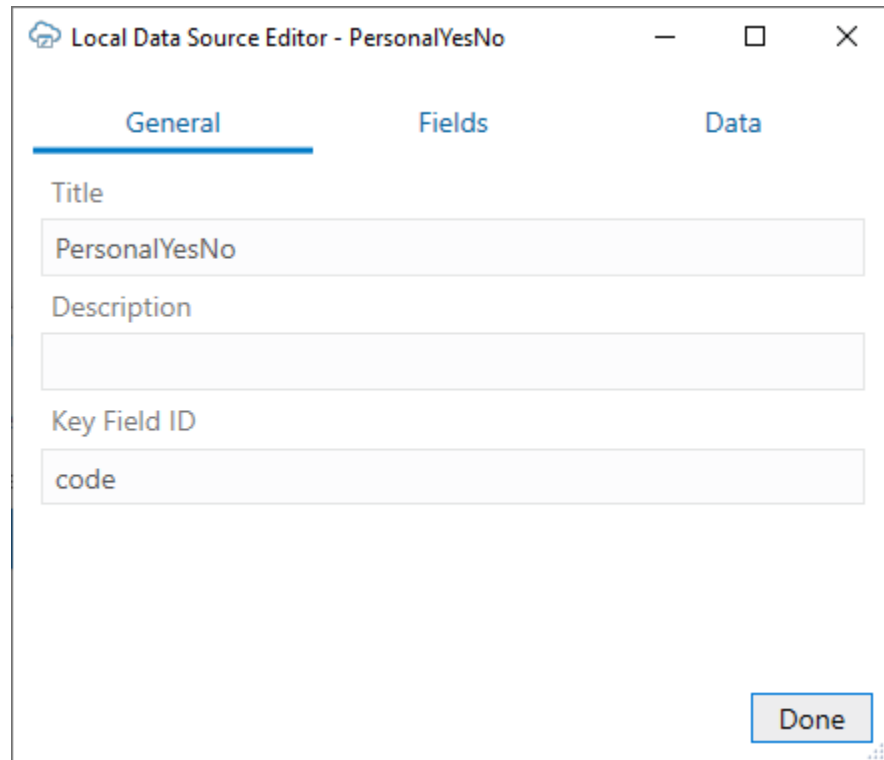
Local data sources have a couple of key benefits. They convert field codes to user-friendly display values automatically to improve the user experience. They also provide the business user with a drop-down list that restricts the choices to a fixed set of appropriate values.

Let's consider an example. You may have a business object, `Computer`, with a string field, `personal`, that captures whether the device is a business or personal one. In this case, the field expects only "Y" and "N" values.

You may want to create an LOV on the `personal` field that displays "Yes" and "No" values in the list. To do this, create a new local data source in the catalog that includes these values, then configure an LOV for the `personal` field that uses this data source.

To create a local data source for a list of values:

1. From the **Oracle Visual Builder** tab, click **Manage Catalogs**.
2. In the **Manage Business Object Catalogs** window, select the catalog where you want to define the data source and click the **Edit Business Object Catalog** icon.
3. From the **Business Object Catalog Editor**, click **Local Data Sources**.
4. From the **Local Data Sources** tab, create a new data source:
 - a. Click the **Add** icon (+) to create a new data source.
 - b. Select the new data source from the list, then click the **Edit** icon (✎) to open the new data source in the **Local Data Source Editor**.
 - c. From the **General** tab, enter a title, description, and key field ID for the data source.



- **Title:** Identifies the local data source when creating a list of values. The title only appears in designer windows, such as the **List of Values** tab in the **Business Object Field Editor**.
- **Description** (optional): Helps workbook developers understand the purpose and use of the data source. The description only appears in the designer.
- **Key Field ID:** The unique key for identifying the data in the local data source. In this example, the key field ID is `code`. You'll create this key field from the **Field** tab, as described in the next steps.

When exporting strings for translation, rows are identified by their key field values. Key field values themselves are not translated.

5. From the **Fields** tab, create fields for the data source.

In this example, you will create two fields of string data-type: `code` and `display`. `code` is the key field ID in our example. `display` stores the values that appear in the list.

 **Note:**

In some cases, you may want to show just the identity values ("Y" and "N" instead of "Yes" and "No") to your business users. In this situation, create one field and use it later as both the identity field and display field in your LOV.

- a. Click the **Add** icon (+).

- b. Select the new field from the list, then click the **Edit** icon (✎) to open the field in the **Local Data Source Field Editor**.
- c. Provide details for the field, then click **Done**.

The value you type into the ID field should match the value you entered into the **Key Field ID** field previously. In this example, type in `code` for the ID field and choose "String" from the "Data Type" list.

Also, provide a title and description for the field. These values help workbook developers identify the field when displayed in designer windows.

 **Note:**

The **ID**, **Title**, and **Data Type** fields are required. The **Description** field is optional.

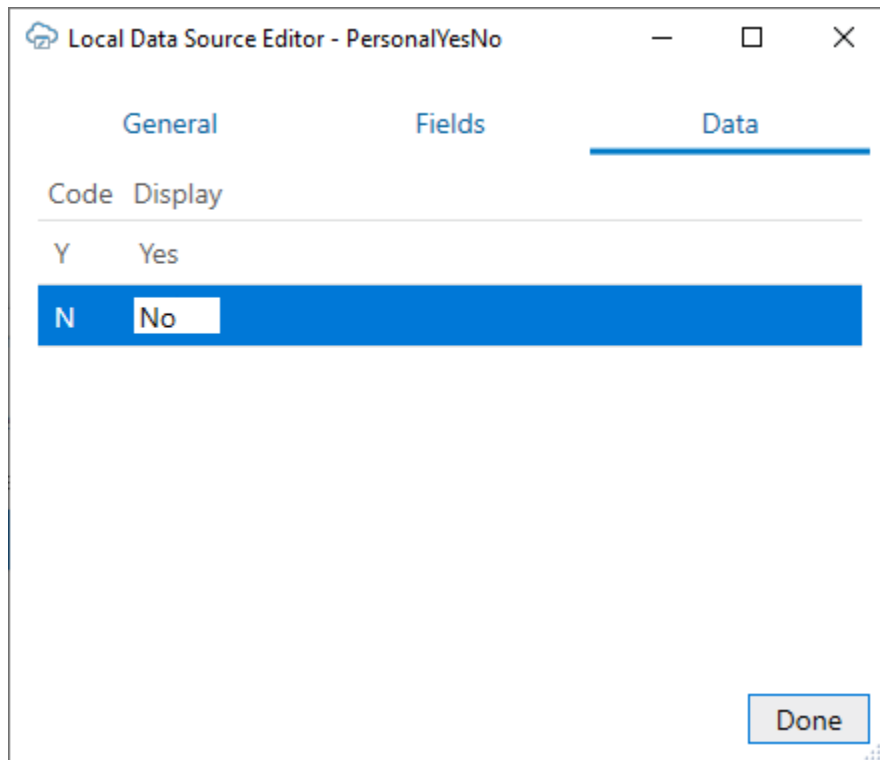
- d. Repeat these steps for the next field. In this example, create the `display` field for your data source.

 **Note:**

Make sure all the fields are configured properly before opening the **Data** tab, as described in the next step. If you make any changes in the **Fields** tab, any data entered in the **Data** tab is cleared.

6. From the **Data** tab, add values to your data source in the newly-created fields.

In this example, you'll enter the expected value (for example, "Y") in the **Code** (key ID) field, and the user-friendly value ("Yes") in the **Display** field, as shown in this image.



To add a row, select the last row and press Enter. To delete a row, select it and press Delete. To select more than one row, use the Shift key.

7. Click **Done**.

Now that you have created a local data source, you are ready to use it as the data source for an LOV. See [Configure a List of Values with a Local Data Source](#).

Configure a List of Values with a Local Data Source

Configure a list of values that references a local data source. List of values are supported for business object fields, custom action payload fields, and row finder variables.

A local data source is a set of name-value pairs stored in the workbook that can be used in a list of values. These local data sources can be created by Oracle Visual Builder Add-in for Excel to store `enums`, if the service includes these. You can also create your own local data sources if required. See [Create a Local Data Source for a List of Values](#).

Let's consider an example. Suppose you have a layout for a computer business object that includes a "personal" column for indicating whether the device is the employee's personal property. You may want to create an LOV on this field that displays "Yes" and "No" values in the list. To do this, create a new local data source in the catalog that includes these values, then configure an LOV for the personal field that uses this data source.

When a business user selects a cell from the personal column in the Computer layout, a popup window shows a list of values drawn from your local data source for the user to choose from.

You can configure a list of values to show more than one display field in the popup window. The add-in shows all the display fields, in separate columns, in the popup window but only those you configure are shown in the Excel cell. If you choose to show more than one field in the cell, the values are concatenated.

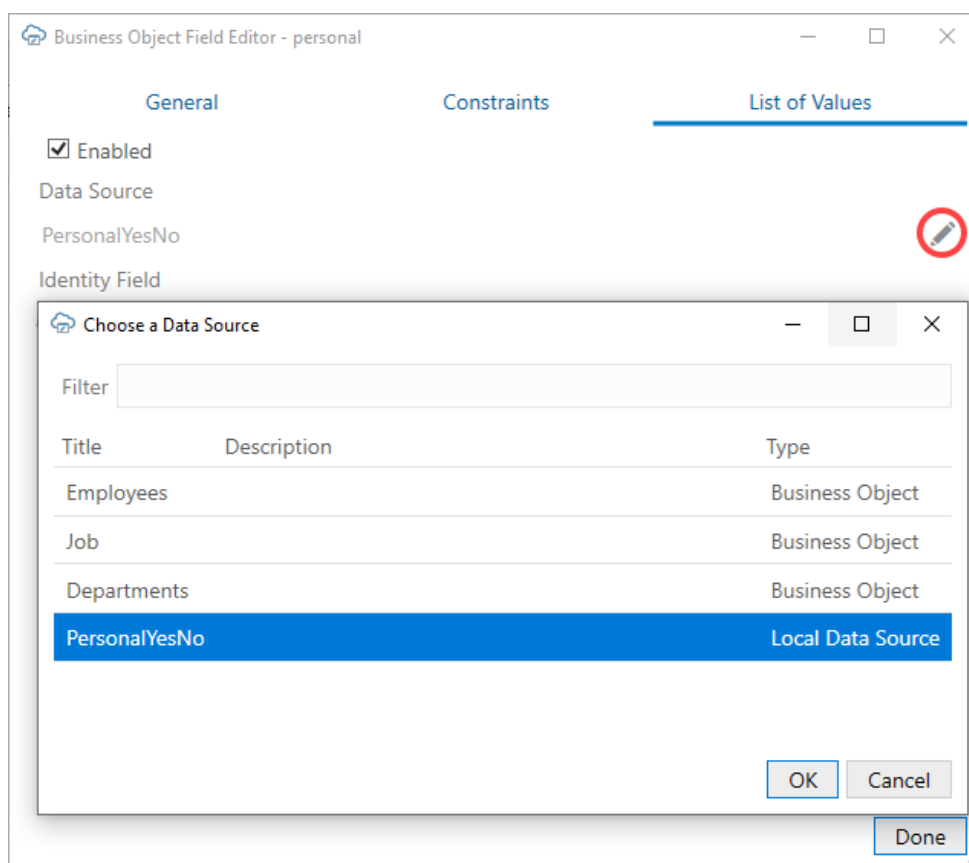


Note:

Lists of values based on local data sources do not support filters or search in the drop-down list.

To create a list of values with a local data source:

1. From the Layout Designer, click the **Edit** (✎) icon next to the Business Object field.
2. From the Business Object Editor, click the **Fields** tab, then select the business object's field.
3. Click the **Edit** (✎) icon to open the Business Object Field Editor, then click the **List of Values** tab.
4. Select the **Enabled** check box on the **List of Values** page.
5. Click the **Edit** (✎) icon next to the **Data Source** field, then pick an appropriate local data source.



This data source provides the display values for the corresponding identity values.

6. Click the **Edit** (✎) icon next to the **Identity Field** field, then choose the appropriate identity field from the local data source.

This is the field used to look up the display values for the identity values in the current field.

7. Click the **Add Field** (+) icon to open the **Available Business Object Fields Editor**, then choose the desired display field.

These fields come from the data source and are shown instead of the identity values where this field is used in a layout.

You can choose multiple display fields for one list of values. Repeat this step to add additional display values.

8. For each display field, select either **Picker and cell** or **Picker only** from the **Display Type** list.

If you configured only one display field, use **Picker and cell** to display the value in both the Excel cell and the popup window. For additional display fields, use **Picker only** if you don't want to display the value in the Excel cell.

 **Note:**

When configuring the display values, make sure the information in the cell is unique and meaningful for your business users. Take for example a Contact field in your layout. To ensure your business users have enough information to determine the right contact for a purchase order, you may want to include the contact name, company, and email as display fields in the Excel cell. In this case, ensure that the display type for these display fields are set to **Picker and cell**.

9. Click **Done**.

During runtime, the business user sees the user-friendly values from the display field of the data source in the LOV, as shown here:

	A	B	C	D	E	F	G
1	Change	Status	Id	Hostname	Personal	Owner	Key
2	Update		1	a	Yes	1
3	Update		2	b	No	1
4	Update		3	c	Yes	2
5	Update		4	d	No	4
6					Yes		
7					No		
8							

The choice list will appear wherever that business object or payload field appears. For the row finder variable, the choice list will appear wherever that row finder variable appears during download.

The add-in [caches the data of list of values](#) in the workbook. After you modify the configuration of any list of values, click **Clear List of Values Cache** from the **Advanced** menu.

List of Values for Descriptive Flexfields

Oracle Visual Builder Add-in for Excel supports lists of values for context-sensitive descriptive flexfields (DFF) with "parameter" and "segment" client binds.

Parameter type client binds must be configured from the Polymorphic Information tab of the Business Object Field editor before they become available. See [Configure the Bind Parameters for a Descriptive Flexfield's List of Values](#).

Segment type client binds are supported automatically as long as the service's OpenAPI 3 document provides all the proper metadata. If the metadata is present, the add-in configures the list of values at runtime.

Limitations

- Client binds are not supported on "global" DFF fields.
- Only binds of data type string and number are supported. Binds of date type are not supported.

Configure the Bind Parameters for a Descriptive Flexfield's List of Values

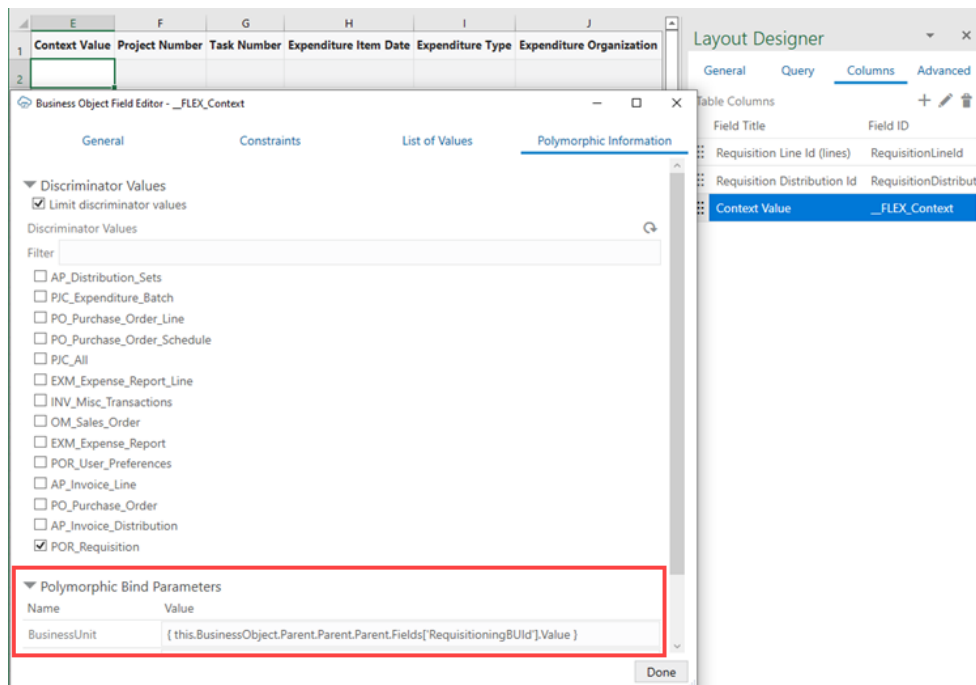
Configure parameter-type client binds used by segments in a descriptive flexfield (DFF) using the Business Object Field Editor.

Oracle Visual Builder Add-in for Excel currently only supports configuring the polymorphic bind parameters. Other details of the list of values for DFFs must come from the metadata and are not configurable.

To configure polymorphic bind parameters (also known as "flex bind variables"), open the **Business Object Field Editor** for a DFF from the Layout Designer, and then configure the bind parameters in the **Polymorphic Bind Parameters** area of the **Polymorphic Information** page.

For example, suppose you want to configure the bind parameter, **BusinessUnit**, for a list of values on a polymorphic field set (Context Value column in the Layout Designer). To configure the polymorphic bind parameters in this case:

1. From the Layout Designer, click the **Columns** tab and then select the Context Value column.
2. Click the **Edit** icon (✎) to open the **Business Object Field Editor**.
3. From the **Polymorphic Information** tab, configure the bind parameters, as shown in the following image:



- The value of a bind parameter can be a literal value like `100001`, `Requisition001`, or a string that contains one or more expressions surrounded by curly braces `{ }`
- An expression can refer to the value of a field in any business object in the current business object hierarchy. The field referred to must be exposed in the in an existing layout.
- In this example, the value is a single expression, where
 - *this* is the polymorphic field set
 - *this.BusinessObject* is the business object that owns the polymorphic field set (the DFF business object)
 - *Parent* gets the parent business object in the hierarchy (bottom-up: `RequisitionDistributions/projectDFF`, `RequisitionDistributions`, `RequisitionLines`, `PurchaseRequisitions`)
 - *this.BusinessObject.Parent.Parent.Parent* is the `PurchaseRequisitions` business object that owns the field. `RequisitioningBUID`
 - `Fields[<field ID>].Value` gets the current field value of the field with the given field ID. Note the single quotes (required) around the ID.

See [About Expressions](#) for more information.

Limitations

- This feature only supports lists of values in context-sensitive DFF fields and not "global" DFF fields.
- Only binds of data type "string" and "number" are supported.
- The add-in uses client binds if and only if the OpenAPI 3 document provides proper metadata.
- Expression syntax is limited to what's shown in the example (key parts: *this*, *BusinessObject*, *Parent*, `Fields[<field ID>].Value`).

Clear Cache for a List of Values

A list of values' choices are always cached in the workbook.

The cache for a list of values based on a business object can contain up to 300 items, plus all used items. It is populated during the first download or the first time the search-and-select window is used. The search-and-select window shows the cached list of values, if available. An upload also uses cached data.

As a workbook developer, remember to click **Clear List of Values Cache** from the **Advanced** menu:

- Whenever you change any list of values configuration, and always when you publish the workbook
- When the service host is changed.
- When cached data is not what the user expects.

Notes and Limitations for Lists of Values

Review the notes and limitations listed here when planning to use lists of values (LOV):

- For Oracle business object REST API services, "row context" list of values is not supported.
- Only one identity field is supported in a list of values.
- Display values support strings; identity values support integers or strings. Decimal numbers, dates, and date-time values are not supported.
- Excel drop-down lists using data validation may not be compatible with the add-in.
- For Oracle business object REST API services, if the catalog includes metadata for an LOV, the add-in reads the metadata and configures the LOV automatically. Supported ControlTypeHints: "combo_lov", "choice", and "input_text_lov".
- For any read-only field (column or form), the add-in still swaps identity values for display values. However, the search-and-select window does not appear when the cell is selected.
- When using an expression that refers to a field in an ancestor layout, ensure:
 - The referenced field is present in the ancestor layout.
 - The ancestor column in the current layout is configured properly so that the add-in can map a row to its ancestor row.
- A field's LOV can be dependent on an ancestor field as long as that ancestor field does not have an LOV that is dependent on another field.
- When creating a cascading set of LOVs, you can use a "local" LOV (one based on a local data source) as the initial list, but not as one of the subsequent lists. A "remote" LOV (one based on a business object as the data source), however, can depend on a value in a local LOV.
In a cascading list of values, the value selected in one list determines the range of values that users can select from subsequent lists.

9

Appearance of an Integrated Excel Workbook

Oracle Visual Builder Add-in for Excel automatically manages the appearance of an integrated Excel workbook through built-in styles and data format types.

The add-in automatically formats cells in a workbook by creating a set of named Excel styles when the workbook is first initialized. The styles created by the add-in are consistent with Oracle Alta UI standards and Oracle accessibility guidelines. The format portion of the styles is sensitive to the user's preferences as defined in the Windows region settings. So a US user will see US dates and a French user will see French dates.

Once the styles are initialized, the add-in applies those styles to the integrated cells, according to the field's properties, at key points (such as during a data download). Typically, the styles are created once for a workbook and are never updated, but you can take advantage of the options described in this chapter.

Reset Workbook Styles

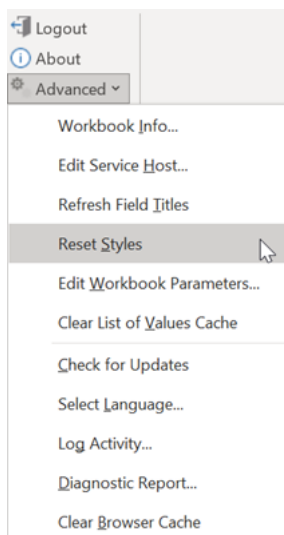
You have the option to reset styles in an Excel workbook when a new add-in version has updated style definitions and you want to use those styles in an older workbook, or when a user has changed style definitions in a workbook and wants to revert to the current definitions.

To reset the style definitions in a workbook, select **Reset Styles** from the Advanced menu.



Note:

The **Reset Styles** command is only available when the designer tools have been enabled.



You are prompted to confirm. After confirmation, each style definition used by the add-in is updated. The list of styles includes any style that would be created by the current add-in, including the Normal style.

Choose Field Formats

Cell formats in an Excel workbook are applied by the add-in according to a field's data type and based on whether the field is editable (create or update). While this behavior works for most scenarios, sometimes you might want to extend a field's formatting options.

Let's consider the example of an employee workbook that includes ID and Salary fields, both of which are integers. A value of 10,000 for the Salary field can be formatted with the thousands separator (10,000 versus 10000). But an ID value of, say, 12300 seems odd with the thousands separator (12,300). In this case, you can override the ID field's default format to choose a format without the thousands separator.

To override the default format for a field:

1. In the Layout Designer's Columns tab, select the field you want to update and click the Edit icon.
2. In the Business Object Field Editor that appears, select an option in the **Format** drop-down. The default value is `Default`, which tells the add-in to apply the usual automatic styles without any override.

Remember, the format types shown to you are based on what's appropriate for the field's data type. In this image of an employee's workbook, the ID field uses the Integer data type and the available options let you format the ID with or without the thousands separator. The options also follow user preferences as defined in the Windows Region settings, so a US user will see a decimal point ($\pi = 3.14$) while a French user will see a decimal comma ($\pi = 3,14$).

The screenshot shows the Oracle Layout Designer interface. On the left, a table with columns 'Id*', 'First Name', 'Last Name*', 'Email*', 'Job Title', 'Department*', 'Salary', 'Hire Date', and 'Manager Id' is visible. The 'Id*' column is selected. The 'Layout Designer' window is open, showing the 'Columns' tab. The 'Business Object Field Editor - id' dialog is open, showing the 'Format' dropdown menu. The options are: Default, Default, With thousands separator and zero decimal digits (12,300), and Without thousands separator and zero decimal digits (12300). A mouse cursor is pointing at the 'Without thousands separator and zero decimal digits (12300)' option.

3. Click **Done**.
4. Click **Download Data** to process the change.

Add Help Text to Your Workbook

You can add help text for business object fields you use in forms and tables in your workbook to provide help to your business users. Your users will see a popup with this help when they select a form field or column header in a layout.

You can also add help to:

- Custom actions
- Custom action payload fields
- Row finders
- Row finder variables

To add help text, open the editor for the field, action, finder, or variable and type help text in the **Help Text** field on the **General** tab, as shown here:

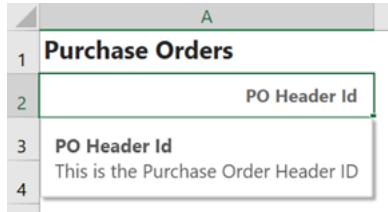
The screenshot shows a window titled "Business Object Field Editor - POHeaderId" with three tabs: "General", "Constraints", and "List of Values". The "General" tab is selected. The form contains the following fields:

- ID**: POHeaderId
- Title**: PO Header Id
- Help Text**: This is the Purchase Order Header ID (highlighted with a red border)
- Data Type**: Integer
- Format**: Default
- Description**: (empty text box)

A "Done" button is located at the bottom right of the window.

Help Text values, as well as **Title** values, can be localized. See [Manage Workbook Translations](#).

Once configured, help text for business object and item-level custom action payload fields is displayed when the user selects the form field label or table column header in a layout.



The screenshot shows a table with four rows. Row 1 is the table title 'Purchase Orders'. Row 2 is a column header 'PO Header Id'. Row 3 is the field label 'PO Header Id'. Row 4 is the help text 'This is the Purchase Order Header ID'. The table is displayed in a grid layout with a light gray background and a white border.

	A
1	Purchase Orders
2	PO Header Id
3	PO Header Id
4	This is the Purchase Order Header ID

Help text for custom actions and business object-level payload fields is displayed in the custom action wizard, either in the **Description** field for custom actions or in a popup when you hover over the payload field. Help text for row finders and variables is displayed in the Search Editor when you hover over the finder or variable label.

10

Data Validation

Oracle Visual Builder Add-in for Excel provides data validation during data entry based on the business object field definitions, custom action payload field definitions, and custom validation rules. Data validation catches errors during data entry when it's easy to correct a mistake rather than after a failed upload attempt.

When a business user works with data in a workbook, the add-in validates data in new and updated fields and raises a data entry error if it detects an invalid value. Business users will need to fix all data entry errors before they can upload successfully.

Cells that fail validation are marked with a red border. Rows that contain validation errors are also flagged as `Invalid` in the **Status** column. The add-in displays an error message in a popup if the business user selects the cell with the error.

The add-in validates data at these key points when the business user is working in a layout:

- On required fields in a row when the row is added to the form or table of a layout
- When the business user completes an edit on a field. At this point, the add-in validates all editable fields in that row.
- At the beginning of an upload

Local field properties are used for validation. Validation that is enforced by the REST service is not triggered at the points mentioned here. REST service validation is generally triggered by the requests sent during upload. For details on upload failure handling, see [Upload Changes](#).

When a row is marked for a custom action, the custom action's payload fields also receive the same validation. See [Custom Actions](#).

Here are the validation conditions the add-in checks for:

Condition	Description
The entered value matches the data type of the field.	<p>If a value doesn't match the data type, the add-in displays a popup with the validation failure message. For example, if the business user enters a string, such as <code>one thousand</code>), in a field with a <code>Number</code> data type, the add-in displays the message: "The value is not valid for the expected data type: <code>Number</code>".</p> <p>Data types include <code>String</code>, <code>Date-Time</code>, <code>Integer</code>, <code>Number</code>, and <code>Boolean</code>. A field's data type is defined in the Business Object Field Editor for the field. See Configure Business Object Fields.</p>
A value has been entered for a field that is required for update or create.	<p>If no value is entered, the add-in displays a popup with the validation failure message. During table or form row creation, the add-in automatically flags all required fields. Whether a field is required for update or create depends on the Required for update and Required for create check boxes on the Constraints tab of the Business Object Field Editor. See Configure Business Object Fields.</p>
The value of a field with a list of values is a value available from that list.	<p>If, rather than selecting a value from the list, the business user types in a value that is not in the list, the add-in displays a validation failure message.</p>
The value of the field matches the criteria configured for the field in a custom field validation rule.	<p>A custom field validation rule is an expression that restricts the range of allowable values during data entry. When a business user enters a value, the add-in evaluates the expression based on the value and, if the expression evaluates to true, the value is judged to be valid. If the expression evaluates to false, the value is invalid, and the add-in displays the validation failure message configured for the rule. See About Custom Field Validation Rules.</p>

About Custom Field Validation Rules

A custom field validation rule is an expression you define for a business object or custom action payload field that restricts the range of allowable values during data entry. When a business user enters a value in a form field or table cell, Oracle Visual Builder Add-in for Excel checks the value against the configured rule and raises a data entry error if the value does not match the set criteria.

These rules can catch invalid values during data entry when it's easy to correct a mistake rather than having to find errors during upload.

Custom rules are expressions using the add-in's expression language that evaluate to true or false. When a business user enters a value, the add-in evaluates the expression based on the value and, if the expression evaluates to true, the value is judged to be valid. If the expression evaluates to false, the value is invalid, and the add-in displays a popup with the validation failure message instead.

You can define a rule that compares the value the business user enters with a constant or with the result of an expression involving other field values in the same row. Expressions must compare values that match the field's data type. For example, an expression on a integer field such as `{ this.Value <= 500 }` compares an integer entered by the business user (`this.Value`) with an integer constant (500).

Custom rules are supported on business object and custom action payload fields.

Supported Expressions

When constructing a custom field validation rule, these expressions are supported:

- `this.Value` returns the current field value, where "this" is a regular business object field or custom action payload field.
- `this.BusinessObject.Fields['<FieldID>'].Value` retrieves another field value in the same row as the current field, where:
 - `this` refers to the current field;
 - `BusinessObject` refers to the business object (the same row) of the current field;
 - `Fields['<FieldID>']` refers to the ID of a field (<FieldID>) in the set of fields for the business object; and
 - `Value` refers to the value of the given field (<FieldID>).
- `this.CustomAction.PayloadFields['<FieldID>'].Value` gets a given payload field value (`PayloadFields['<FieldID>'].Value`) in the same custom action (`this.CustomAction`).

The custom field validation rule does not support:

- The `Parent` keyword (for example, `this.BusinessObject.Parent.Fields['<FieldID>'].Value`) to get a field value from a parent or other ancestor business object
- Accessing field values from child and other descendant business objects
- The `CustomActions` keyword (for example, `this.BusinessObject.CustomActions['CustomActionID']`) to access a custom action from a regular field

Sample Validation Rule Expressions

Custom rules use the add-in expression language. See [About Expressions](#) for more information.

Expression	Use
<code>{ this.Value <= 500 }</code>	<p>This rule compares the value in the cell (<code>this.Value</code>) to a constant (500) and displays the validation failure message if the value is more than this amount.</p> <p>You would use this rule for the Amount field of an Expenses layout to limit the amount for each expense in an expense report to \$500 or less.</p>

Expression	Use
<pre>{ this.BusinessObject.Fields["UnpaidAmount"].Value > 10000 ? this.Value == "Group 1" : this.Value == "Group 2" }</pre>	<p>This rule checks the value in an Invoice Group cell (either <code>this.Value == "Group 1"</code> or <code>this.Value == "Group 2"</code>) to ensure the correct value is provided based on the value in the Unpaid Amount cell (<code>this.BusinessObject.Fields["UnpaidAmount"].Value > 10000</code>) in the same row.</p> <p>If the unpaid amount is over \$10,000, then the invoice group should be "Group 1"; otherwise, the invoice group should be "Group 2". If the wrong group is selected, the add-in displays the validation failure message.</p> <p>You would use this rule for the Invoice Group field of an Invoices layout to require the business user to enter the correct invoice group based the unpaid amount of an invoice.</p>
<pre>{ this.Value > 0 && this.Value < 50 }</pre>	<p>This rule checks the value in the cell and displays the validation failure message if the value is outside a given range (between 0 and 50).</p> <p>You would use this rule for a Commission Percentage field to ensure the commission is larger than zero but less than 50%.</p>
<pre>{ (this.Value - this.BusinessObject.Fields['OldSalary'].Value) / this.BusinessObject.Fields['OldSalary'].Value * 100 < 5 }</pre>	<p>This rule compares the value in the cell (<code>this.Value</code>) to the value in another cell (<code>this.BusinessObject.Fields['OldSalary'].Value</code>) and displays the validation failure message if the increase is 5% or greater.</p> <p>You would use this rule on the New Salary field to ensure an employee's raise is within your company's salary cap.</p>

Default Values

During the evaluation of rules, empty cells are treated as:

- zero (0) for numeric fields (Integer and Number data types)
- empty strings (") for string type fields
- False for Boolean type fields



Note:

It is not possible to distinguish an empty cell from the default value for validation rules evaluation.

Create Field Validation Rules

You can define custom field validation rules to ensure your business users are entering valid values when they create or update a row or form in a layout.

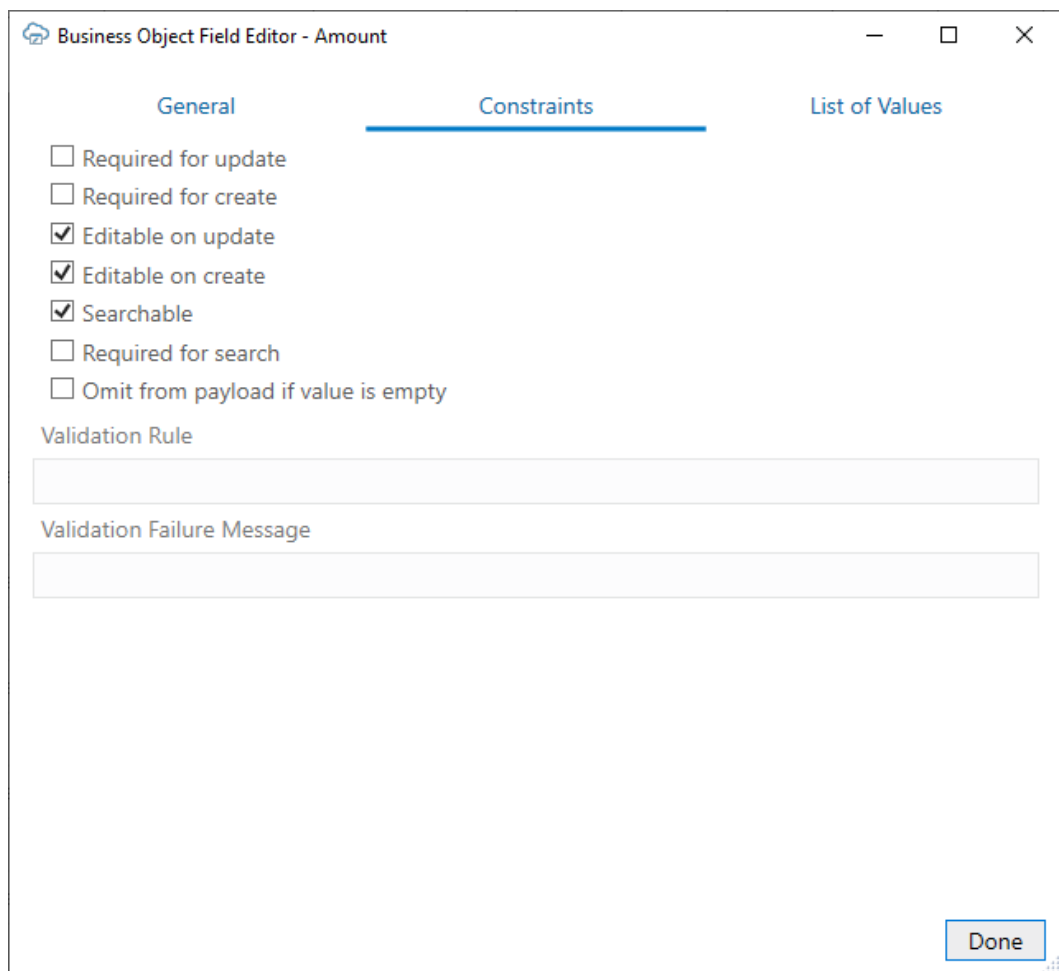
For example, you may want to limit the amount for each expense in an expense report to \$500 or less. To do this, you can enter a rule for the "Amount" field like this: `{ this.Value <= 500 }` where `this.Value` refers to the value of the currently-selected cell. During data entry, the add-in marks the row as "Invalid" if the value entered exceeds \$500.

If the business user selects the cell with the error, the add-in displays a popup with a description of the error. You can also provide a custom error message when you define a rule.

For help on the add-in expression language, see [About Expressions](#).

To create a custom field validation rule:

1. Open the **Business Object Field Editor** of the field you want to set a validation rule for, then click the **Constraints** tab.



The screenshot shows the "Business Object Field Editor - Amount" dialog box with the "Constraints" tab selected. The dialog has three tabs: "General", "Constraints", and "List of Values". The "Constraints" tab is active and contains the following options:

- Required for update
- Required for create
- Editable on update
- Editable on create
- Searchable
- Required for search
- Omit from payload if value is empty

Below these options are two text input fields:

- Validation Rule
- Validation Failure Message

A "Done" button is located in the bottom right corner of the dialog.

 **Note:**

For a custom action payload field, navigate to the **Custom Action Payload Field Editor** instead.

2. Type in your validation rule in the **Validation Rule** field using the add-in expression language. The expression must comply with the add-in's expression language and evaluate to true or false.

For example, to limit the value in an Amount field to \$500 or less, type:
{ this.Value <= 500 }

3. To provide a custom error message, type your message in the **Validation Failure Message** field.

Use this field to provide a brief explanation for your business users of what values are expected for this field. This value can be localized.

Validation Rule

{ this.Value <= 500 }

Validation Failure Message

The amount entered exceeds \$500. Please enter an amount that is \$500 or less.


At runtime, if a business user enters a value that violates the validation rule, the add-in marks the row as invalid and displays a red outline around the invalid cell. If selected, the add-in displays an error popup with the validation failure message.

ExpenseReports

Expense Report Id*	1234	Region*	North America
Purpose		Final Approval Date	
Reporter Id*	Neena	Approver Id	
Status Id	Pending	Revision Num	3.00

Change	Status	Expense Id*	Justification	Amount	Start Date	End Date	Expense Type Id*	Expense Source Id*	Revision Num	Key
Create	Invalid		1	600.00			Hotel	Corporate Card		

Amount

 **Invalid**

The amount entered exceeds \$500. Please enter an amount that is \$500 or less.

Notes on Custom Field Validation Rules

Here are some things to keep in mind when creating custom field validation rules.

Supported Fields

Fields with these data types are supported: String, Number, Integer, and Boolean.

Unsupported Fields

These fields are not supported:

- **Fields with Object, Date (no time), Date-time, or Unsupported data types**
- Fields with a configured list of values. The add-in already performs validation on these fields to ensure the value is a valid entry from the list.
- Discriminator fields from a polymorphic business object
- Ancestor fields

Limitations

- A rule expression for a field cannot refer to a field value from a different row or from a different layout.
- Multiple validation rules on one field are not allowed. However, you can use logical operators, `&&` and `||`, in one validation rule to the same purpose.

Validation Behavior

- Validation rules are not evaluated on download. So, if the downloaded data includes values that violate the rules, the violations are not highlighted after download completes.
- When a cell is modified, all editable cells in that row are validated.

11

Upload Changes

When you are done editing data in an Excel workbook, you are ready to upload the changes to the REST service.

Upload Changes from a Table Layout

When you click the **Upload Changes** button for a Table layout, here's what happens:




1. The add-in checks the table for pending changes. If there are no pending changes, upload is skipped.
2. If a Pre-Upload macro is configured, it is invoked. If the macro throws an exception or returns any value other than `true`, the upload process quits.
3. For pending Create and Update operations, the rows are first validated locally, for example, data type, required, and so on. See [Data Validation](#). Any failures are marked as failed and skipped (these rows do not produce requests on the business object service).
4. Pending changes are generally processed as follows:
 - a. Updates result in a PATCH or PUT request on the item path.
 - b. Creates result in a POST request on the collection path.
 - c. Deletes result in a DELETE request on the item path.
 - d. Rows marked for action result in a POST request on the item action path.

For more details on how rows are sent in separate requests, see [Upload Table Changes Using Separate Requests for Each Row](#).

 **Note:**

Batch processing is handled differently. See [Upload Changes Using Batch Requests](#).

5. Success and failure is noted in the Status column. Rows with warnings are indicated with a warning icon.

	A	B	C	
4	Change	Status	Expense Report Id*	
5		Update Succeeded	15,001	Orad
6		Update Succeeded	15,002	Orad
7		Create Succeeded	1	trip b
8		Create Succeeded 	2	
9		Update Succeeded 	15,003	Orad
10		Succeeded: Reject	15,004	Orad
11		Succeeded: Reject 	15,005	Orad
12	Reject	Failed: Reject	15,006	Orad
13		Succeeded: Reject	15,007	Orad

Errors and warnings are cached and displayed in the Status Viewer when the business user selects a row. Here is a sample of the Status Viewer showing three warnings on 8 successful changes.



- Successful Create rows are updated from the service if possible. These rows are converted into existing rows that can be edited.

 **Note:**

If the service does not return the updated row, you will need to download again.

- Successful Delete rows are removed from the Excel worksheet.

For Create and Update operations, the request payload only includes values for editable cells in a new or updated row. Read-only fields and custom action payload fields are not included. Whether a value is included for an editable cell depends on your add-in settings:

- For updated rows, the request payload includes a value *for each editable field* unless **Send Only Changed Data for Updates** is enabled in the Layout Designer. When enabled, only values that have changed since the last download or upload are included in the payload. See [Send Only Changed Data During Upload](#).
- For new and updated rows, the request payload includes a null value for each empty cell in the row unless **Omit from payload if value is empty** is enabled for a field in the Business Object Field Editor.

When this check box is enabled and the corresponding cell is empty, the field is not included in the request payload. When this check box is not checked and the corresponding cell is empty, the field is included in the request payload with a null value. See [Omit Empty Values During Upload](#).

The add-in may send up to four requests to the service at a time for improved performance (on different threads). As a result, the order in which the rows are sent to the server is non-deterministic. It is not guaranteed to be in the same order as in the table. See [Configure Parallel Requests During Upload](#).

Upload Changes from a Form-Over-Table Layout

When a user clicks the **Upload Changes** button for a Form-Over-Table layout, here's what happens:

1. The add-in checks the form for a pending Update or pending Create operation and the table for pending changes. If there are no pending form or table changes, upload is skipped.
2. If a Pre-Upload macro is configured, it is invoked. If the macro throws an exception or returns any value other than `true`, the upload process quits.
3. When the form has a pending Update or pending Create operation:
For a pending Update:
 - a. A GET request is sent to the parent's item path.
 - b. Form field values (for example, data type, required, and so on) are validated; read-only fields are skipped. If validation failures exist, the upload is stopped and no subsequent REST requests are made.
 - c. When all form fields are valid, a request (PATCH/PUT) is sent to the parent's **item** path. The payload for this request contains the values of all form fields that have been changed. If configured, empty values are skipped. See [Omit Empty Values During Upload](#).

For a pending Create:

- a. Form field values (for example, data type, required, and so on) are validated (see Data validation in *Managing Data Using the Oracle Visual Builder Add-in for Excel*); read-only fields are skipped. If validation failures exist, the upload is stopped and no subsequent REST requests are made.
- b. A POST request is sent to the parent's **collection** path. The payload for this request contains a value (possibly empty) for every editable form field in the form. If configured, empty values are skipped. See [Omit Empty Values During Upload](#).

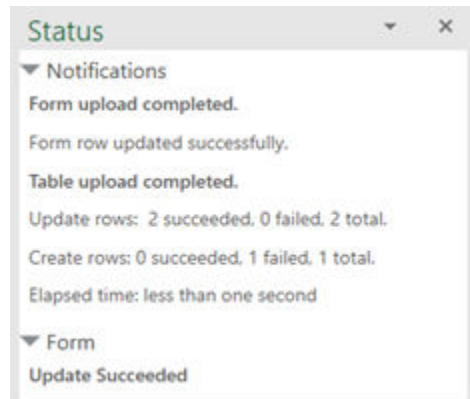
The child table is not involved in this step.

4. The results of the form upload are reflected in the status viewer immediately.
5. If the form upload fails, the add-in stops and does not attempt an upload on the child table.
6. If the form upload succeeds, the add-in proceeds with the child table as follows:
 - a. Checks the child table for pending changes, creates, deletes, custom actions, etc.
 - b. If changes are found, the child table upload proceeds in the same manner as a Table layout upload with one important difference: the child business object's paths are used for each request.

The number of requests used in the upload depends on the scope of the changes as well as the state of the **Send Descendant Rows in Parent Payload** check box. If this check box is selected, the add-in sends parent changes and all child changes in a single request. See [Upload Parent and Child Changes in the Same Payload](#).

If this check box is deselected *and* the form and table both have pending changes, then the add-in sends the changes using a minimum of two requests: one for the form and one (or more) for the child table.

For the form changes, notification of success and failure is noted in the Status Viewer.



For table changes, success and failure is noted in the table's Status column and well as in the Status Viewer. See [Upload Changes from a Table Layout](#) for more information about table status after Upload.

Invoke Custom Actions via Upload

For Oracle business object REST API services that expose custom actions that correspond to the item path, the user can mark rows so that the custom action is called on those rows during the upload. For custom actions that require payload fields, table columns that correspond to those fields must be added. See [Custom Actions](#). During the upload operation (which may also include update, create, and delete tasks), the add-in performs the following steps for each row marked for action:

1. Creates the payload by collecting the cell values for each custom action field column and adding the value to a simple JSON object (member name/value pairs) in the payload. If configured, empty values are skipped. See [Omit Empty Values During Upload](#).

The entire payload body follows this example format:

```
{
  "rejectionReasonCode": "Other: contact approver",
  "notes": "Details with manager"
}
```

- There is no other content in the POST request body (no action name, no array of argument values).
- If any values from these columns are invalid (missing when required, incorrect data type, Excel formula error), the row is omitted from the Upload and marked

as failed. See Data validation in *Managing Data Using Oracle Visual Builder Add-in for Excel*

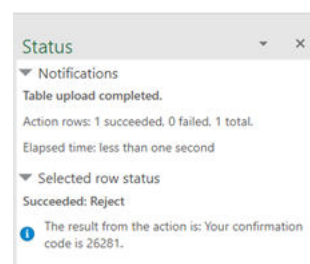
2. Prepares the request:
 - REST-Framework-Version header added (see [Configure the REST-Framework-Version](#))
 - Content-Type header added based on each custom action's Request Media Type property on the **Custom Action Editor** (available from the **Business Object Editor** > **Custom Actions** tab)
3. Makes the request:
 - Sends the POST to the custom action path (POST is the only HTTP method supported for invoking custom actions)
 - See the note below about batch requests.
4. Processes the response:
 - For 200 response status, the row is marked as succeeded.
 - For 400 response status, the row is marked as failed, and the response payload is parsed for Oracle business object REST API service error content; error details can be seen in the Status Viewer pane.
 - A 412 response status indicates that the row was modified by some other agent or user after it was downloaded to the Excel table; such a status is treated as a row-level error

Cell values in action rows are not refreshed. If the custom method logic in the service has altered any values in the row, those changes will not be reflected in the table row until the next download.

If the response payload for the Custom Action request includes a "result" member with a simple value such as a string or number, then the add-in displays that result in the Status Viewer. The response payload for a successful invocation should have a result member in the following format:

```
{
  "result": "<return-value-from-custom-action-method>"
}
```

For example, after invoking the custom action "Reject" on an Expense Report table row, the REST service may return a result such as "result": "Your confirmation code is 26281.". This result is displayed in the Status Viewer, as shown here:



See [Executing a Custom Action](#) in the *Developing Fusion Web Applications with Oracle Application Development Framework*.

For information on custom actions, see [Custom Actions](#).

Upload Table Changes Using Separate Requests for Each Row

For REST services (including Oracle business object REST API services with batch processing turned off), Oracle Visual Builder Add-in for Excel sends each changed row in a separate request ("row-wise" processing) during upload. For Oracle business object REST API services, the default is to send multiple rows' worth of changes in a single POST request. This is referred to as "batch" processing. See [Upload Changes Using Batch Requests](#).

Row-wise processing is also used when either:

- Batch support has been disabled by the workbook developer for a specific Oracle business object REST API business object.
- When there is a Custom Action row in a given batch that does not support being invoked in a batch. See [Batch Mode for Custom Actions](#).

Row-wise Behavior

When a user clicks the **Upload Changes** button (and batch processing is not supported or enabled), here's what happens:

1. The add-in divides all changed rows into sequential collections (blocks) of 25 rows each.
For example, block 1 has changed rows 1-25, block 2 has rows 26-50, and so on.

Note:

Each block may contain a mixture of kinds of changed rows such as Update, Create, Delete, and custom action invocation.

2. The add-in creates up to 4 background threads, based on the Parallel Requests value, and assigns each thread a block as a unit of work. See [Configure Parallel Requests During Upload](#).
3. Each background thread then processes the block by:
 - Sending a separate REST request for each of the 25 changed rows in the block (`PATCH` or `PUT` for update, `POST` for create, `DELETE`, or `POST` for invoking a custom action).
 - Waiting for the response for each row before sending the next request.
4. When the add-in has received responses from the REST service, it processes the responses for each block, in order.
The add-in updates the Change and Status columns. If the REST service returns the row's field values in the response, the add-in writes these values for changed rows back into the table rows.
5. The add-in repeats these steps for the entire set of changed rows, processing up to 4 blocks of 25 changed rows at a time, until all changed rows have been processed.

Upload Changes Using Batch Requests

By default, Oracle Visual Builder Add-in for Excel uses batch requests to upload changes to Oracle business object REST API services.

During an upload operation, the add-in sends multiple rows per request using a batch API. Rows marked for Update, Create, Delete, and custom actions are included in the batch requests. If required, you can disable batch requests. See [Disable Batch Requests for Upload](#).

Batch requests are only supported on Oracle business object REST API services. For other REST service types, the add-in sends just one row per request. See [Upload Changes from a Table Layout](#) and [Upload Changes from a Form-Over-Table Layout](#).

During upload, the add-in uses an algorithm to determine the optimal size of the payload (number of rows) for a batch request as the upload operation proceeds. This is done to optimize performance and avoid timeouts. It works like this:

1. The add-in sends an initial set of batch requests using 10 rows per batch.
2. The add-in measures the response times for those initial requests and calculates the approximate number of rows that can be processed in 10 seconds.
3. Using the new value, the add-in sends one or more batches to the service.
4. The add-in recalculates the number of rows after each set of batch requests, using the target of 10 seconds per request, until all rows have been processed.



Note:

The target of 10 seconds is not guaranteed, since actual response times vary depending on the REST service business logic, server load, network latency, and so on.

If a batch request contains one or more errors, no changes are made by the service. In that case, a second batch request containing only the rows that succeeded during the first batch request is sent. If the second batch request fails, the add-in falls back to sending one row per request. For more information, see [Making Batch Requests](#).

If a set of changes includes custom actions and those actions have batch enabled, the changes are included in a batch request. However, if one or more rows is marked for a custom action that has batch disabled, the add-in reverts to sending the changes row by row. (See also [Batch Mode for Custom Actions](#).)

If you configure the add-in for parallel requests, it sends up to four batch requests in parallel depending on your settings. To ensure that all row requests are sent one by one in sequence, set the slider to 1. See [Configure Parallel Requests During Upload](#).

If you configure the add-in to send descendant rows in the parent payload, then batch requests are not used. See [Upload Parent and Child Changes in the Same Payload](#).

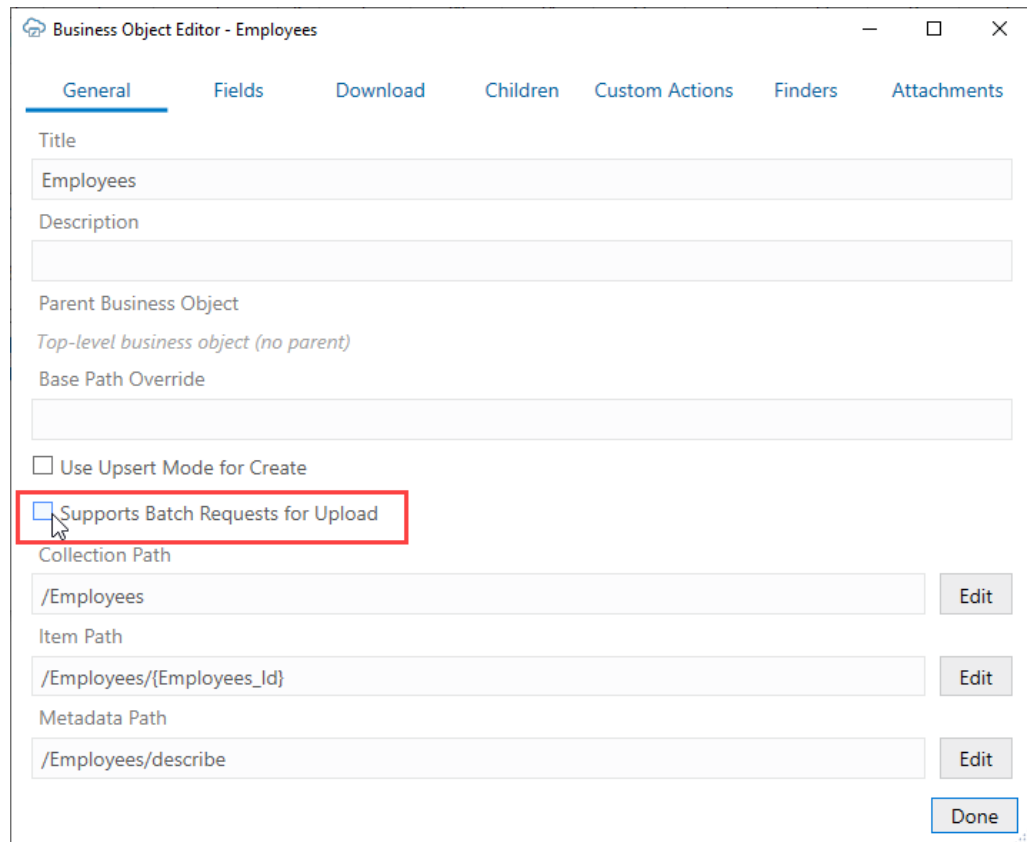
Disable Batch Requests for Upload

Some Oracle business object REST API services require a separate REST request for each changed row. For services with this requirement, you'll experience issues if the add-in uses

batch requests. In this scenario, you can disable batch requests from the Business Object Editor.

If your business object doesn't require separate REST requests, it is strongly recommended that you use the default batch request behavior as described in [Upload Changes Using Batch Requests](#).

To disable batch requests for a business object, deselect the **Support Batch Requests for Upload** check box from the business object's Business Object Editor as shown here:



The screenshot shows the 'Business Object Editor - Employees' window. The 'General' tab is active. The 'Title' field contains 'Employees'. The 'Description' field is empty. The 'Parent Business Object' is 'Top-level business object (no parent)'. The 'Base Path Override' field is empty. The 'Use Upsert Mode for Create' checkbox is unchecked. The 'Supports Batch Requests for Upload' checkbox is checked and highlighted with a red box. Below this are fields for 'Collection Path' (/Employees), 'Item Path' (/Employees/{Employees_Id}), and 'Metadata Path' (/Employees/describe), each with an 'Edit' button. A 'Done' button is at the bottom right.

This check box is selected by default for Oracle business object REST API business objects. This check box is not present for other REST service types.

When you disable batch requests for a business object, the add-in uploads each changed row using a single request as it does for other service types. See [Upload Changes from a Table Layout](#) or [Upload Changes from a Form-Over-Table Layout](#).

Specifically, the add-in sends:

- A row marked for Update using a PATCH request.
- A pending Create row using a POST request.
- A row marked for DELETE using a single DELETE request.
- A row marked for a custom action using a single POST request even if the **Batch Mode Enabled** check box is selected for the custom action. See [Batch Mode for Custom Actions](#).

Depending on network characteristics and REST service overhead and performance, disabling batch requests may result in a negative effect on performance, such as adding significant wait time for the business user.

When batch requests are enabled, the add-in can adapt the size of the batch based on the REST service's responsiveness. When disabled, each changed row is instead sent using a separate REST request, resulting in many more REST requests per upload operation.

Workbook owners are responsible for any performance issues that arise. Make sure to test that your use cases will succeed in all customer environments and scenarios, if batch requests are disabled.

Upload Parent and Child Changes in the Same Payload

Some services require that parent and child row changes be uploaded using the same REST request payload. If your service requires this, you can configure your integrated workbook to upload all changes in a single, "nested" upload.

This feature is only available for Oracle business object REST API services and should only be enabled if the service requires that parent and child changes be included in a single request. For example, your REST service may include logic that requires you to create at least one child (for example, a "Line" item) when you create a parent item (for example, a "Supplier Negotiations" item). In this case, the REST service enforces this by requiring the POST request that includes a new Supplier Negotiations item to also include at least one new Line item.

Likewise for updates. Your REST service may include back-end logic that requires operating on all changed child items at once and so all changes must be included in a single PATCH request.

If the service doesn't have this requirement, it is strongly recommended that you use the standard upload logic described in [Upload Changes from a Form-Over-Table Layout](#).

You enable this feature on a Form-over-Table layout from the Advanced tab of the Layout Designer. When enabled, Oracle Visual Builder Add-in for Excel includes all changes in the layout's form fields and table rows in the payload of a single REST request.

If your Form-over-Table layout is the primary layout in a set of dependent layouts, all changes from descendant layouts ("grandchildren", "great-grandchildren", and so on) are also included in the single REST request. See [Use Multiple Layouts for Multi-level Business Objects](#).

Before you continue, please review [Notes and Limitations of Single Payload Uploads](#) to determine if you should enable this feature.

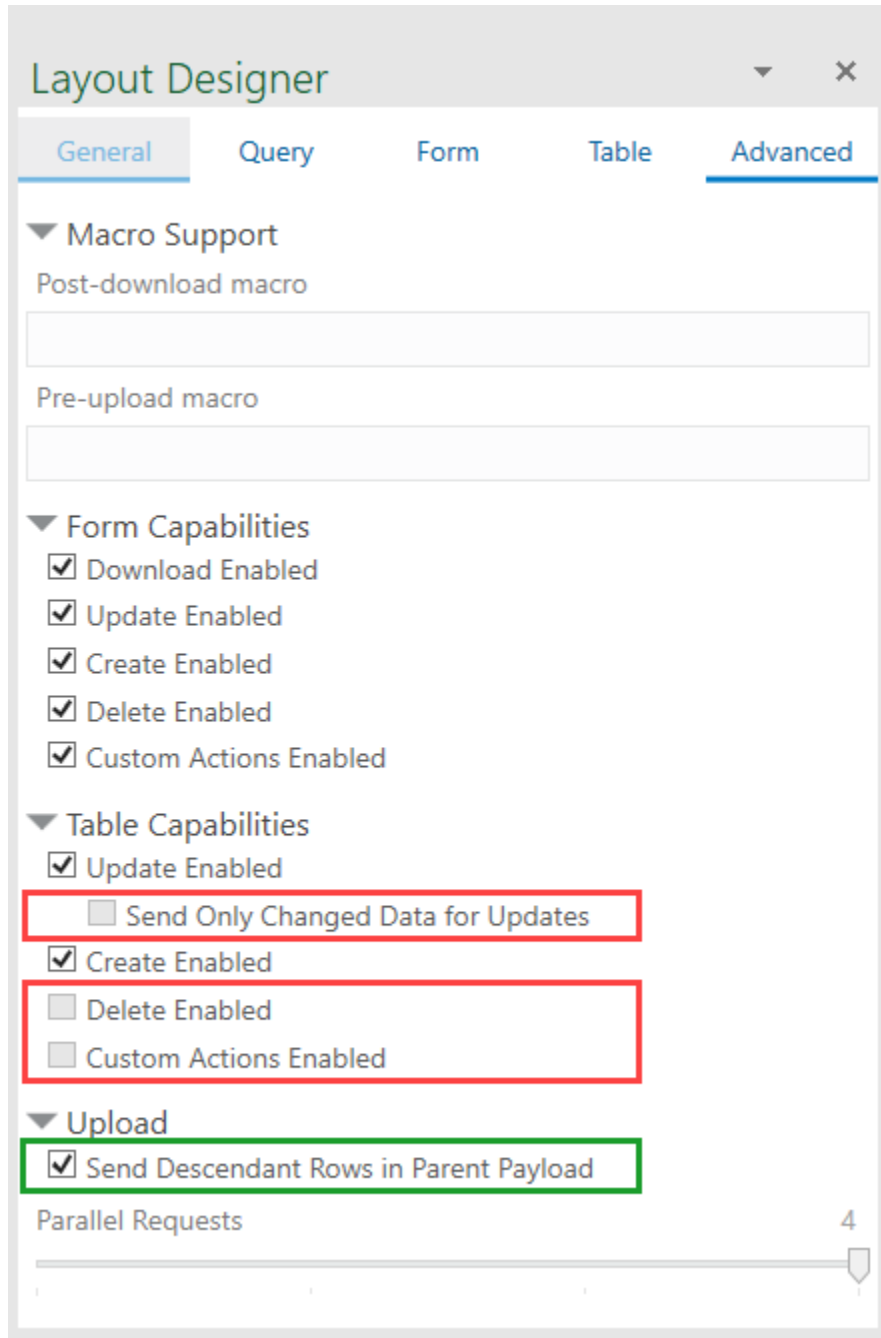
To configure your workbook to use nested upload:

1. Open the worksheet with the Form-over-Table layout that displays the parent and child business objects that need to be uploaded together.
2. In the Oracle Visual Builder tab, click **Designer** to open the Layout Designer in the Excel Task Pane.
3. From the Advanced tab of the Layout Designer, select **Send Descendant Rows in Parent Payload**.

When you select this check box, the add-in deselects these options for the table in the Form-over-Table layout as well as any descendant table layouts:

- **Send Only Changed Data for Updates**
- **Delete Enabled**

- **Custom Actions Enabled**



4. If you use this feature for a set of dependent layouts, add primary key columns in the child and descendant table layouts to support updates.

As with other dependent layouts, add ancestor (direct parent) columns to support creates. See [Create a Table Layout in an Excel Workbook](#) and [Add a Parent Column to Support Row Creation](#).

When a business user performs an upload, the add-in reports the success or failure of the upload operation. If the upload was a success, the add-in makes these updates for each changed row:

- The Change column in the table is cleared.
- The Status column displays an appropriate success status message, such as "Create Succeeded" or "Update Succeeded".
- The Status Viewer displays notification messages for the successful form and table operations.

 **Note:**

Uploaded child and grandchild table rows are not refreshed automatically after the upload. The Status Viewer indicates this with a message: "This row may not contain the latest information from the service. Download to refresh the information for this row.". The business user will need to download data again to see the latest complete row data.

If the upload fails for any row at any level in the hierarchy, all submitted rows are marked as failed by the add-in. In this scenario:

- The Change column in the table is left as is for all rows.
- The Status column displays an appropriate failure status message for each changed row, such as "Created Failed" or "Update Failed".
- The Status Viewer displays the same notification messages for changed rows, regardless of which table row is selected. The messages contain any parent failure messages along with the failure messages for child rows.

When an error occurs, the business user may have to visit each layout and scan the rows to find which row caused the failure.

Notes and Limitations of Single Payload Uploads

Single payload uploads (also referred to as "nested" uploads) are only supported for Oracle business object REST API services. They are restricted to Form-over-Table layouts that are either "standalone" or the root layout in a set of dependent layouts. Review this section to see if the feature is suitable for your integrated workbook.

 **Note:**

If your service doesn't require that parent and child changes are included in a single request, it is strongly recommended that you use the standard upload logic described in [Upload Changes from a Form-Over-Table Layout](#).

Requirements

- The service must support request payload structures that include child and descendant rows included with the parent fields. Rows for child business objects are included as array-typed members as peers of the parent's fields. These child rows in turn include the child fields along with arrays of grandchild rows, and so on.
- The business object must support the use of Upsert mode when uploading both new and changed rows in the same upload request.

This requirement refers to the service itself. Oracle Visual Builder Add-in for Excel does not have to be configured to use Upsert mode for the business object to support this feature.

Form and Table Capabilities

Form rows marked for deletion or custom action are not affected by this feature. These changes are sent in separate DELETE and POST requests and are not included in a "nested" upload request.

Some Table capabilities are incompatible with the nested upload feature. As a result, these capabilities are disabled for the table in the Form-over-Table layout as well as any descendant table layouts when the nested upload feature is enabled:

- **Send Only Changed Data for Updates**
- **Delete Enabled**
- **Custom Actions Enabled**



Note:

"Read-only" or "download only" tables are not included in a nested upload. Read-only tables are those that do not have create, update, delete, or custom actions enabled.

Scalability

Be aware that this feature will not scale to handle large, enterprise-level volumes. If you enable this feature for your workbook, you are responsible for any scalability issues that arise. Make sure to test your workbook to verify that all required use cases will succeed in all customer environments and scenarios.

Potential scalability issues include:

- Complex business logic or the processing of large numbers of nested child items could push the request duration beyond what some load balancers and other network components, such as Akamai, support. This could result in the request failing due to a timeout.
- Large request payload sizes will likely consume large amounts of memory and CPU. This could potentially affect other clients working against the same endpoint, virtual machine, or container.
- Large request payload sizes could exceed the maximum supported by the endpoint. In this case, the endpoint could reject the request as a potential "Denial of Service" attack.

Data Consistency and Conflict Detection

When this feature is enabled, PATCH requests with parent and child changes in the payload may result in changes previously uploaded by another user being overwritten without notification. This can occur when multiple users are acting on the same business object rows using different workbooks.

Consider a scenario where two users, user A and user B, both download data at the same time. If user A uploads their changes to child or descendant rows and then later

user B uploads their changes to the same rows, user B's changes will overwrite user A's changes.

Also note that the "Upsert" scenario, where an existing parent item is uploaded with new child rows, does not currently support conflict detection.

Child and Descendant Primary Keys Included in Tables

Additional configuration may be needed by the workbook developer to support PATCH cases. To ensure that updates succeed, you must include primary/alternate key fields as columns in child and other descendant Table layouts.

The child items' key values must appear in the payload, in the array of child items. The service must be able to locate the existing child item in order to update it.

Upload Changes Using Upsert Mode

Oracle business object REST API services support an optional "upsert" mode that you can use when uploading changes to your REST service.

Ensure that your REST services business object supports upsert mode before you enable it.

When upsert mode is enabled, the REST service should behave as follows: first, it examines the incoming payload of a create row request. Next, if the payload contains enough information to match an existing row, the operation updates that existing item. If there is no match, the operation should create a new row. See [Updating or Creating Resource Items \(Upsert\)](#) for more information.

The exact behavior of upsert mode is determined by the service.

You enable upsert mode by selecting the **Use Upsert Mode for Create** from the General tab of the Business Object Editor. After you enable it, refresh any layouts in the workbook that are based on that business object.

Note:

This check box is only available for Oracle business object REST API services and is hidden for all other service types.

Business Object Editor - Employees

General Fields Download Children Custom Actions Finders Attachments

Title
Employees

Description

Parent Business Object
Top-level business object (no parent)

Base Path Override

Use Upsert Mode for Create

Supports Batch Requests for Upload

Collection Path
/Employees Edit

Item Path
/Employees/{Employees_Id} Edit

Metadata Path
/Employees/describe Edit

Done

When upsert mode is enabled, the add-in sends the HTTP header, `Upsert-Mode: true`, with POST requests for single-row creates. For batch mode, the add-in sets the operation value for each batch part to "upsert" instead of "create".

Omit Empty Values During Upload

You can configure Oracle Visual Builder Add-in for Excel to omit fields with empty values during upload.

Request payloads for Create and Update operations normally include a value for every column in the table (except those for read-only fields and custom action payload fields) even if the cell value is empty. For empty cell values, a null value is included for that field in the payload. Null values can potentially cause validation errors.

To avoid these errors, you can configure the add-in to omit fields with null values from the payload by selecting the **Omit from payload if value is empty** check box in the Business Object Field Editor.

The screenshot shows a window titled "Business Object Field Editor - department" with three tabs: "General", "Constraints", and "List of Values". The "Constraints" tab is active. It contains several checkboxes: "Required for update" (unchecked), "Required for create" (checked), "Editable on update" (checked), "Editable on create" (checked), "Searchable" (checked), "Required for search" (unchecked), and "Omit from payload if value is empty" (checked). The "Omit from payload if value is empty" checkbox is highlighted with a red rectangular border. Below the checkboxes are two text input fields labeled "Validation Rule" and "Validation Failure Message". A "Done" button is located in the bottom right corner.

When selected, the add-in won't include the field in the payload during upload if the value in the field is empty.

The add-in sets the default value for the **Omit from payload if value is empty** check box based on the "nullable" property in the OpenAPI v3 (OA3) document for this field. If "nullable" is true, the check box is deselected and cells with empty values are uploaded; if "nullable" is false (or the property is missing), then the check box is selected and cells with empty values are omitted from the upload.

 **Note:**

If this check box is selected (empty cell values are skipped), you won't be able to change a "non-empty" value to an empty value for a field in an existing row.

Send Only Changed Data During Upload

You can configure Oracle Visual Builder Add-in for Excel to send only changed data from a Table layout or the table part of a Form-over-Table layout during an upload. The add-in always sends only changed values from the form area of a Form-over-Table layout.

Request payloads for Update operations normally include a value for every editable cell in a row marked for update even if the value hasn't changed since the last download or upload operation. For some REST services, sending data that has not been modified in a PATCH, PUT, or batch update request can cause issues.

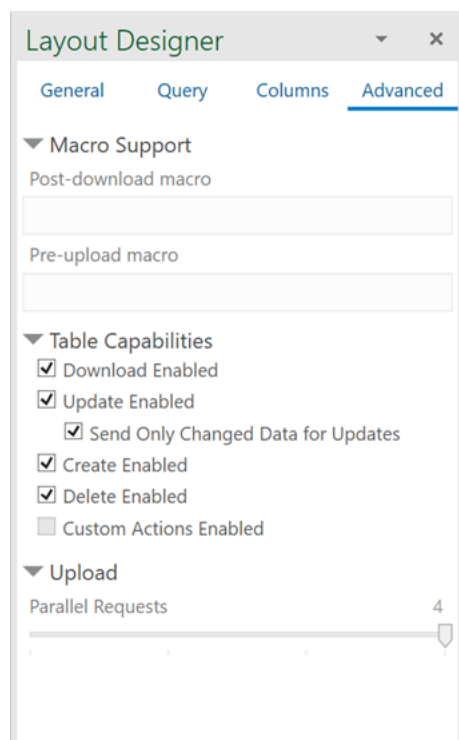
To avoid these issues, you can configure the add-in to send only changed values in the payload by selecting the **Send Only Changed Data for Updates** check box for your table. When this is enabled, cells that are unchanged are not included in the payload.



Note:

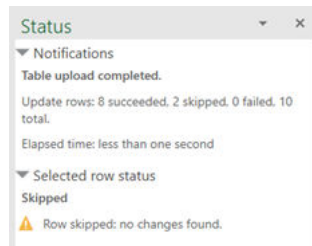
This feature is not available for NetSuite SuiteTalk REST web services.

To enable this feature, select the layout, then open the **Advanced** tab of the Layout Designer. The **Send Only Changed Data for Updates** check box can be found under **Table Capabilities**.



When the check box is enabled, the add-in caches a copy of all of the data in the table during download. Then, when the business user triggers an upload, the add-in compares values in editable cells in rows marked for update to the cached values, and only includes fields that are different in the request payload.

If a row is marked for "Update" in the Change column, but no values have been changed, the row is omitted and the Status column displays "Skipped" after the upload. The Status viewer also displays the results of the upload.



On a successful Create or Upload of a row, the cache is updated with all the current values to be compared during the next upload, if the service provides the row in the response.

Note:

If a field in a table is required for update (the **Required for Update** check box is selected in the Business Object Field Editor), the value is included in the payload even if it is unchanged.

Performance

Please note that this feature may affect performance during download and upload, since the add-in must capture and store a duplicate set of downloaded table data. You can expect workbooks using this feature to increase in size. Also, you may see a slow down in downloads and uploads since the add-in must read from, and write to, the cache.

If you choose to use this feature, it is recommended that you run relative performance tests in realistic environments and assess the performance impact before delivering workbooks with this feature enabled.

REST Request Payload

Let's suppose a business user changes the salary value for an employee named Steven King. When this check box is not selected, the add-in includes both changed and unchanged data in the payload, like this:

```
{
  "FirstName": "Steven",
  "LastName": "King",
  "Email": "SKING",
  "HireDate": "2003-06-17T04:00:00Z",
  "JobId": "AD_PRES",
  "Salary": 120000,
  "CommissionPct": null,
  "ManagerId": null,
  "DepartmentId": 90
}
```

When the check box is selected, only the salary data is included:

```
{
  "Salary": 120000
}
```

Data Consistency

When a workbook uses a compatible REST API service that supports data consistency verification using an entity tag (Etag) mechanism, the add-in detects and reacts to the following scenario:

1. Person A downloads information from a business object into a table in their integrated workbook.
2. Person B downloads the same information into a table in their integrated workbook, edits it, and uploads changes.
3. Person A then edits the same information (downloaded in Step 1) and uploads the changes.
4. The add-in provides the service with the necessary information (entity tags) to prevent Person A's changes from overwriting those changes made by Person B.

The add-in sends an `If-Match` request header containing the entity tag for single row requests or includes the entity tag along with the row changes as part of a batch request. See [Upload Changes Using Batch Requests](#).

When the server inspects the entity tag and detects such a change, its response (either an `HTTP Status 412`, or an error code of 11412) allows the add-in to display an error message for any such rows in the table like this:

```
This row has been modified by another user. Please download before editing.
```

If you see this message, you'll have to discard your changes by downloading the latest data and then redoing your changes as needed.



Note:

Some services do not support this conflict detection functionality. If the service does not, then Person A's changes will replace Person B's changes with no warning. Contact the service owner for more information.

For information about the entity tag (ETag) mechanism, see *Data Consistency Tasks in Accessing Business Objects Using REST APIs*.

If your workbook uses other types of REST services, the last writer wins. So, for the scenario just outlined, Person A's changes in Step 3 will overwrite the changes of Person B in Step 2.

Configure Parallel Requests During Upload

You can configure Oracle Visual Builder Add-in for Excel to send multiple requests in parallel during upload to improve performance and shorten the overall time to upload a large set of changes.

The add-in allows you to set from 1 to 4 requests in parallel. If you leave the setting on the default (4), the add-in sends four requests at the same time during upload instead of one request after another. If you choose a value of "1", the add-in sends only one request at a time during upload.

This feature is available for both layout types and can be set independently for each one.

Parallel requests behave differently than batch requests. With a batch request, the add-in sends the changes for multiple rows in each request; With parallel requests, the add-in sends multiple requests at the same time, regardless of whether the request contains one row or multiple rows.

 **Note:**

While the add-in collects batches of rows in "table order" (from top to bottom), the threading used for parallel requests may result in batches of rows arriving at the REST service endpoint "out of order". For example, batch 7 may arrive at the endpoint before batch 6.

1. Open the Layout Designer for a worksheet and then click the Advanced tab.
2. Under Upload, drag the **Parallel Requests** slider to your desired setting.

We recommend setting the value to 4 parallel requests (the default) during upload. However, some services are not compatible with parallel requests due to their internal business logic. For such services, set this value to "1". Keep in mind that this setting generally results in slower upload performance.

 **Note:**

Take care to test thoroughly in a realistic environment when adjusting this value. Performance may actually degrade if you have too many parallel requests, as may happen if you have multiple users performing uploads at about the same time.

12

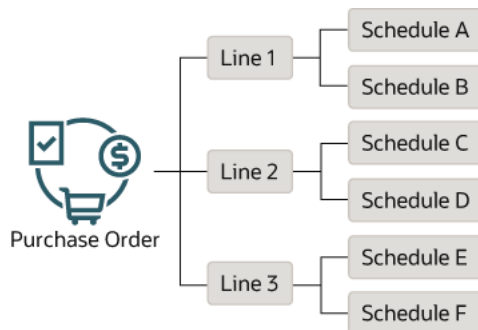
Use Multiple Layouts for Multi-level Business Objects

When business objects have a parent-child relationship, you can create a set of dependent layouts and then perform operations, such as downloading data and uploading your changes, on all your layouts with a single gesture.

Business Object Hierarchies

Consider an example hierarchy of business objects where **purchaseOrders** is the parent, **lines** is the child, and **schedules** is the grandchild.

In this hierarchy, **purchaseOrders** is a collection of top-level purchase orders each with one or more lines for managing the details of each order. Each of these lines may include one or more schedules for tracking shipping details.



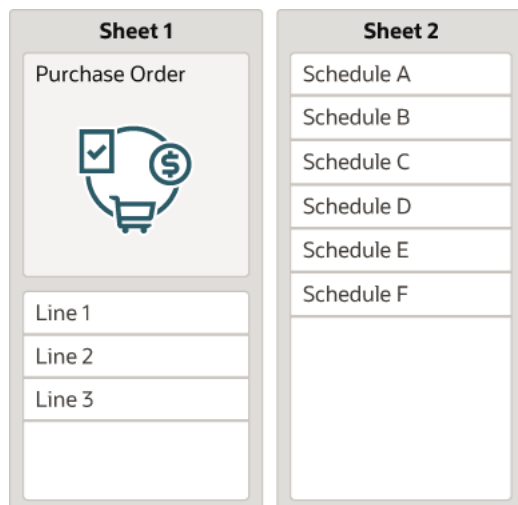
A hierarchy of business objects can go to even more levels ("great-grandchildren" and "great-great-grandchildren") or have more than one business object at each level ("siblings"). For example, the following hierarchy has "sibling" grandchildren (**attachments** and **schedules**) and a "great-grandchild" (**distributions**) under **schedules**.

Configuring Dependent Layouts

When you create a set of dependent layouts, you create either a Form-over-Table or a Table layout as your top-level or "primary" layout on the first worksheet, as well as Table layouts for each subordinate level on separate worksheets. See [Create a Set of Dependent Layouts](#).

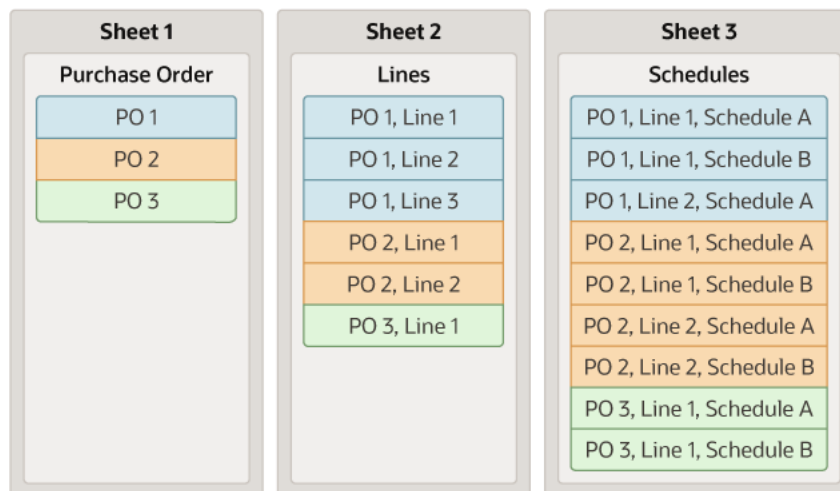
If you want to show a single purchase order and all its associated lines and schedules, create a Form-over-Table layout for the first two levels (**purchaseOrders** and **lines**) and a Table layout for the third level (**schedules**). You can then configure a search to prompt the user to enter a purchase order ID.

When the layouts are populated, the form part of the Form-over-Table layout displays details for the purchase order, the table part shows all the lines for the purchase order, and the dependent Table layout shows all the schedules for the associated lines.



You can also use a Table layout as your primary layout instead of a Form-over-Table layout. In this case, create Table layouts for each level in the hierarchy (**purchaseOrders**, **lines**, and **schedules**) on separate worksheets. As before, link each dependent layout back to its parent.

In this configuration, you can display one or more purchase orders in the primary Table layout, and all associated lines and schedules in the subsequent Table layouts.



 **Note:**

Keep in mind that a single parent may have multiple children with each of these having multiple grandchildren. Consequently, a large number of results in the primary layout may result in very large volumes of data in the subordinate layouts. To avoid performance issues when downloading and uploading data, Oracle recommends that you configure an appropriate query to limit the number of results in the primary layout. See [Configure Search Options for Download](#).

"Siblings" are business objects at the same level and can be at the second level or deeper in your hierarchy. For example, you may have a parent business object (**Expenses**) at the top level and two children (**Itemizations** and **Distributions**) at the second level. In this example, **Itemizations** and **Distributions** are siblings of each other.

To create a set of dependent layouts for this hierarchy, you have two options. You can create a Form-over-Table layout for the parent and one of the children (for example, **Expenses** and **Itemizations**) on one worksheet and a Table layout for the other child (**Distributions**) on a second worksheet. Or you can create Table layouts for each business object (**Expenses**, **Itemizations**, and **Distributions**) on separate worksheets. Again, use a Form-over-Table layout if you want to show a single expense record in the form and list all associated itemizations and distributions in the tables.

Once the dependencies are established, download, upload, and clear operations act on all the linked layouts, starting from the primary layout, followed by the child layouts, the grandchildren layouts, and so on.

Create a Set of Dependent Layouts

Create a set of dependent layouts for a hierarchy of business objects and link the layouts together.

Note:

Before you create a set of dependent layouts, ensure your REST service meets the requirements as set out in [Requirements for Dependent Layouts](#).

To create a set of dependent layouts, run the New Layout Setup wizard on the first worksheet and select the parent and child business objects you want to include. If you choose to create a Form-over-Table layout as the primary layout, you'll need to indicate which child business object you want to use for table part of the layout. When you finish, Oracle Visual Builder Add-in for Excel creates a new worksheet with a Table layout for each additional descendant business object in your hierarchy.

When you have created your layouts, you can configure appropriate queries to limit the number of items to display in your layouts.

If you create a set of layouts but later decide you want to add another descendant business object, simply create a Table layout for the descendant business object and then link the new dependent layout to its immediate parent layout. See [Add a Layout to a Set of Dependent Layouts](#).

When you create a dependent layout, you can choose to include columns from the parent or higher layout to help your business users track which child items are associated with which high-level items. See [Add a Parent Column to Support Row Creation](#).

To enable the creation of items in a Table layout, you may need to add one or more columns to the layout from the layout's immediate parent. Including parent columns in the layout allows your business users to specify a unique parent for any new items they create.

Let's use the example in this section to create a hierarchy of dependent layouts that mirrors your business object hierarchy.

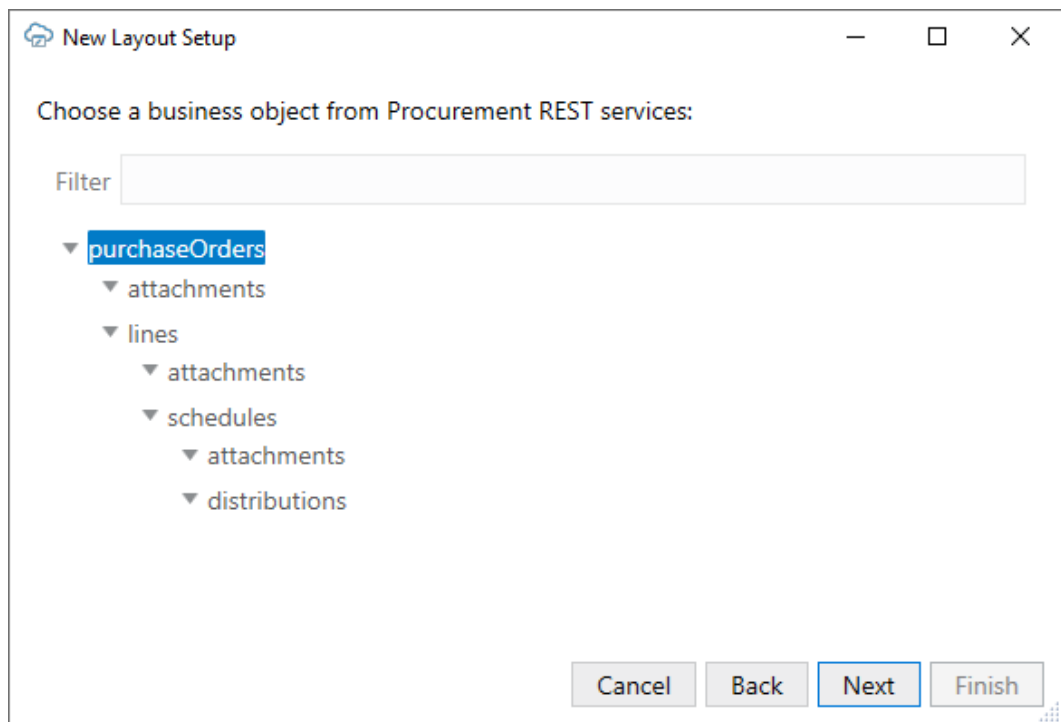
The primary layout in a set of dependent layouts can be a Form-over-Table layout or a Table layout. This topic covers how to create a set of dependent layouts that uses a Form-over-Table as the primary layout, but the principle is the same for using a Table layout as the primary layout.

To create a set of dependent layouts:

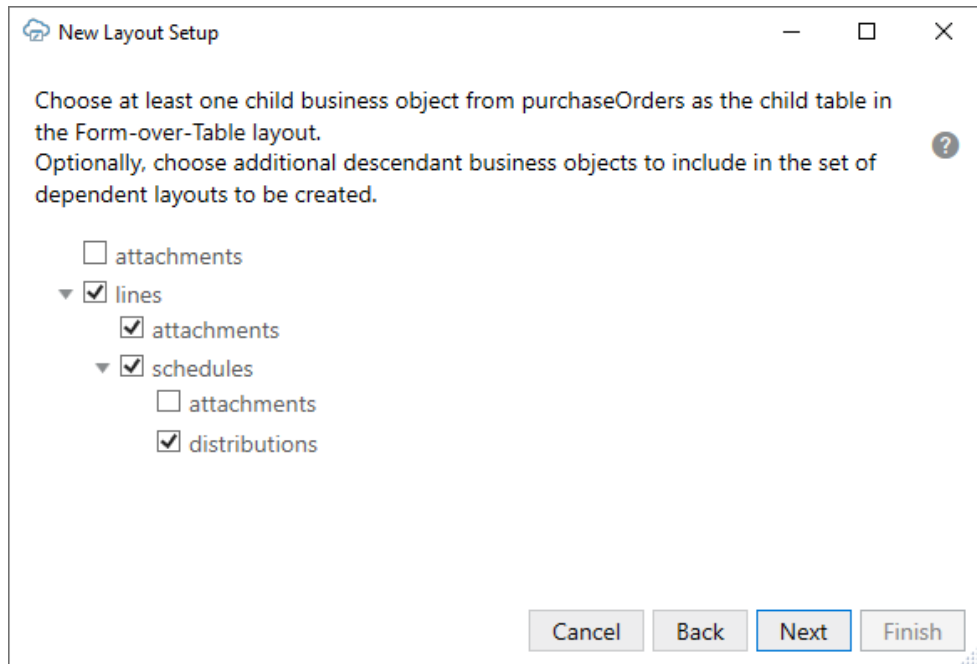
1. Select the cell in a blank worksheet where you want to locate the primary layout.
2. In the Oracle Visual Builder tab, click **Designer** to launch the New Layout Setup wizard.
3. When prompted, provide the service description document.

If the service includes five or more business objects, select the business objects you want to include in the catalog, then click **Next**.

4. Choose a top-level business object, then click **Next**. In our example, select **purchaseOrders** for a Form-over-Table layout showing purchase orders over lines (the first two levels in our hierarchy).

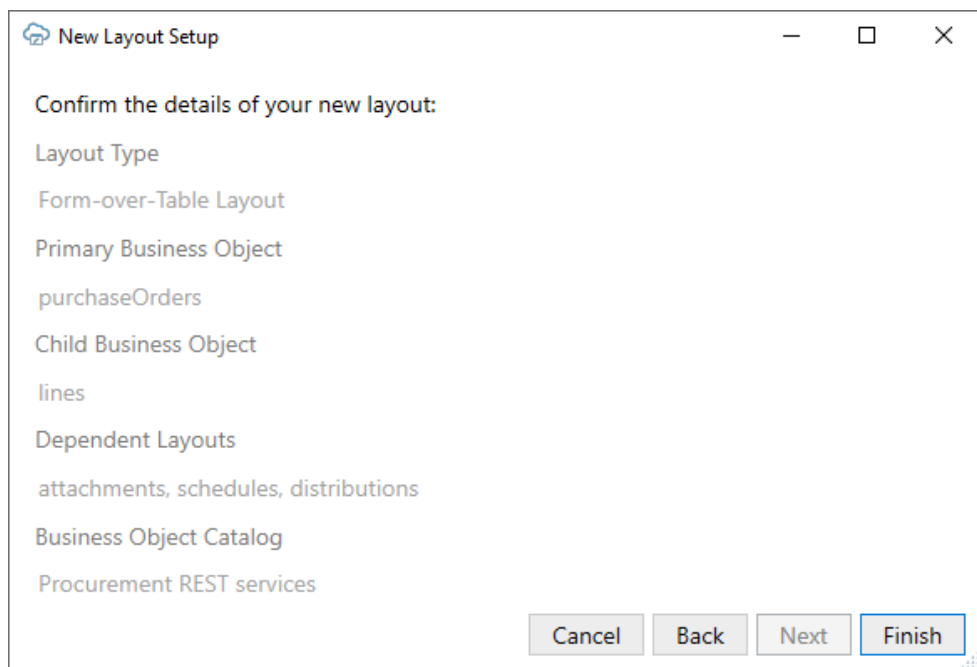


5. Select the desired layout type for the primary layout, then click **Next**.
6. Choose the child business objects you want to include in the set of dependent layouts, then click **Next**. In our example, select **lines**, **attachments**, **schedules**, and **distributions**.



If you are creating a Form-over-Table layout as your primary layout and you selected more than one direct child of the primary business object, you will be prompted to select which business object you want to show in the table of the primary layout. Select a business object, then click **Next**.

The add-in then displays a review of your choices. In this case, the add-in will create a Form-over-Table layout with purchaseOrders in the form and lines in the table. It will also create three linked Table layouts for attachments, schedules, and distributions.



7. Review the layout details and then click **Finish**.

The add-in creates a Form-over-Table layout for purchaseOrders and lines on the first worksheet as well as Table layouts for attachments, schedules, and distributions on separate worksheets in the workbook.

After you have created the set of dependent layouts, you can continue to configure your layouts as required.

Here are some of the changes you might want to consider making:

- If you want to allow your business users to create new rows in a dependent layout, you may need to add a parent column to the layout. See [Add a Parent Column to Support Row Creation](#).
- Even if Create is disabled on a table layout, you might still want to add an ancestor column to a layout to help your business users track which child items are associated with which higher-level items. To add ancestor columns to a layout, see [Manage Fields in a Form or Table](#).
- You may want to configure search parameters on each dependent layout for downloading data. See [Filter Data for a Set of Dependent Layouts](#).

 **Note:**

Before you publish and distribute your workbook to users, test the workbook to ensure that download, upload, or clear operations work on all layouts in the hierarchy as expected. See Manage Data in a Dependent Layout in *Managing Data Using Oracle Visual Builder Add-in for Excel*.

Add a Layout to a Set of Dependent Layouts

You can add a Table layout based on a descendant business object to an existing set of dependent layouts by linking it to the parent business object's layout.

Let's suppose you have created a set of dependent layouts for a hierarchy of business objects that includes **purchaseOrders** (parent), **lines** (child), and **schedules** (grandchild). Now, you want to add another business object, **distributions**, which is the child business object of **schedules** and the great-grandchild of **purchaseOrders**.

To do this, start by creating a new worksheet and then adding a Table layout for distributions. When you create your Table layout, ensure that you select the same business object catalog that is used by your primary layout. When you've finished, use the Layout Designer to choose a parent layout for your new Table layout.

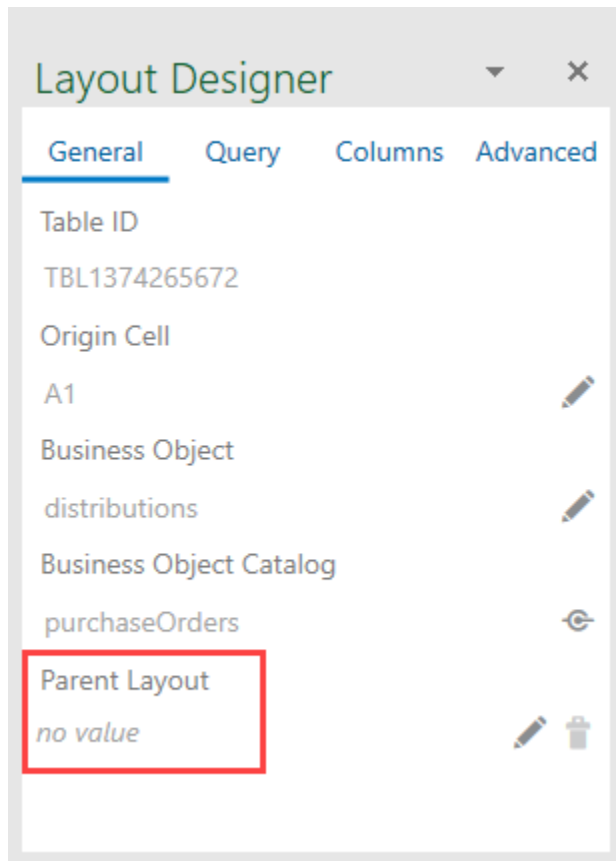
To add a new layout to a set of dependent layouts:

1. Click the New Sheet icon to add a new worksheet.
2. Click **Designer** to launch the New Layout Setup wizard.
3. From the first screen of the wizard, choose the business object catalog and click **Next**.
4. Choose the business object that's next in the hierarchy—for example, **distributions**—and click **Next**.

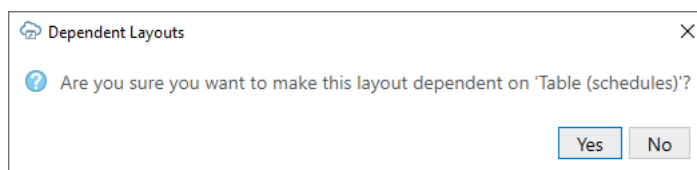
The next screen of the wizard displays the layout type for the new layout. Because distributions is not a top-level business object in the hierarchy, only the **Table Layout** option is available.

5. Click **Next**.
6. Review the layout details and then click **Finish**.

A new Table layout is created for the selected descendant business object in your hierarchy. Notice the **Parent Layout** field in the Layout Designer's General tab, shown here for a distributions layout. This field is only displayed in layouts where the business object is a child of another business object in the same business catalog.



7. To set the parent layout for the new Table layout, click the Choose Parent Layout icon (✎) in the Layout Designer's General tab.
8. Select the appropriate layout from the Dependent Layouts window and click **OK**. If there is only one possible parent layout, a prompt appears asking you to confirm a parent for the layout. Click **Yes** to confirm the parent layout in the hierarchy, for example:



 **Note:**

If you see a message, "No layouts found that this layout can depend on", it may mean the layout is not part of the same catalog or that the sibling business object you are trying to link has already been used in the table part of a Form-over-Table layout.

Add a Parent Column to Support Row Creation

When a business user adds a row to a dependent layout, they may need to indicate the parent item that the child row should be associated with. To ensure they can do this, include columns from the parent layout to the dependent layouts in the set.

Which layouts need parent columns depends on the type of layout used for your primary layout. Let's start with the Form-over-Table case. Let's suppose you have a business object hierarchy where **purchaseOrders** is the parent, **lines** is the child, and **schedules** is the grandchild. For this hierarchy, you create a Form-over-Table with **purchaseOrders** in the form and **lines** in the table, as well as a separate Table layout for **schedules**.

When you download data for this set of dependent layouts, you download a single purchase order for the form, all associated lines for the Form-over-Table's table, and all schedules associated with these lines in the Table layout.

Now let's suppose you want to create a new line for the purchase order. Because the Form-over-Table layout shows only one purchase order in the form *and* only associated lines in the Table, any line you create is automatically associated with the selected purchase order. You don't have to enter a purchase order number to associate it with the selected one.

But what if you want to create a schedule and associate it with one of the lines? The Schedules layout may include schedules from different lines in the purchase order. To make sure the schedule you create is associated with the right line, you'll need to specify an existing line for the new schedule. Therefore, you need to have at least one parent column showing in the Schedules layout that uniquely identifies the line (for example, `LineNumber`).

Likewise for any descendant level below the second level. Suppose our sample hierarchy includes a business object, **distributions** that is the child of **schedules**. A Distributions layout will need to include at least one parent column (for example, `ScheduleNumber`) so that you can specify which schedule a new distribution should be associated with.

 **Note:**

If you have a sibling business object at the second level in this scenario, you don't need to add fields from the parent level. Suppose our sample hierarchy includes an **attachments** business object that is the child of **purchaseOrders** and the sibling of **lines**. If you create a Table layout for attachments that you link to the primary layout, then the add-in only downloads attachment rows that are associated with the selected purchase order. If you create a new attachment, it is automatically associated with this purchase order.

Now let's look at the second case: when the primary layout is a Table layout. In this scenario, the primary Table layout may display multiple purchase orders. The second-level Table layouts (attachments and lines) may then include rows for each of the purchase orders

downloaded in the primary layout. Similarly, the third and fourth-level layouts (Schedules and Distributions) will include schedules and distributions from different purchase order and lines.

If you want to create a new line for a purchase order, you'll need to specify an existing purchase order. Therefore, you'll need to have at least one parent column showing in the Lines layout that uniquely identifies the purchase order (for example, the `PO Header Id` field).

Here are a few things to keep in mind when adding parent columns:

- The parent column you choose must uniquely identify the parent record and must be exposed in the parent layout.
- If no parent columns are configured, the table cannot support item creation and rows inserted into the table are ignored during upload.
- If a desired parent field is already displayed as a column in the child layout, remove that column from the layout and instead add it as a parent column as described in this task.

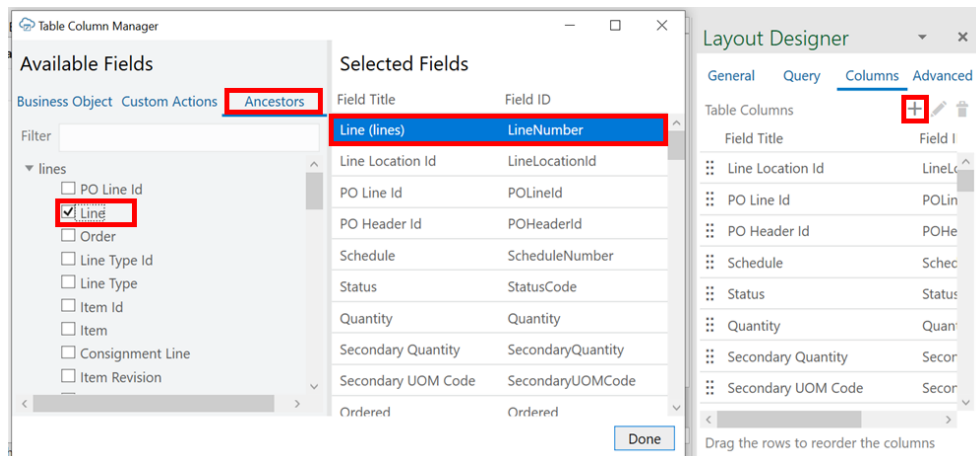
 **Note:**

If a grandparent or higher field is already exposed as a column and is required for create or update, do not remove it.

To add a parent column:

1. Select the dependent layout you want to add a parent column to, then click the **Columns** tab in the Layout Designer.
2. From the top left corner of the Columns page, click the Manage Column icon (+) to open the Table Column Manager.
3. From the Table Column Manager, click the **Ancestors** tab from the **Available Fields** pane.

Available ancestor columns are grouped by business object. In this image, fields for the lines business object are shown under **lines** and those for the schedules business object are shown under **lines > schedules**.



 **Note:**

The field must be exposed as a column or form field in one of the higher-level layouts. If you don't see the field you want, you'll need to add it to the ancestor layout.

- Expand the list if necessary, then select the parent field you want to add to your layout.

 **Note:**

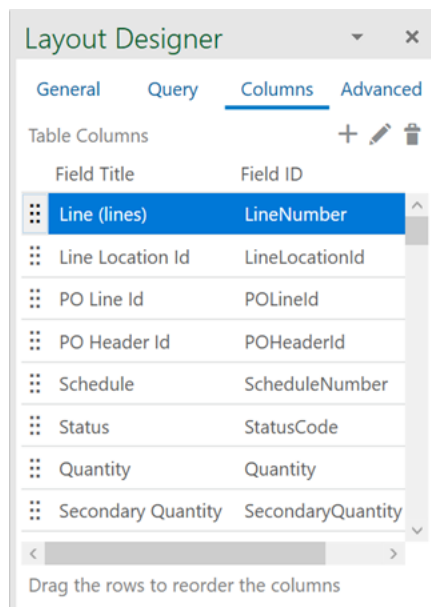
To add a parent field before an existing column in the table, select the existing column in **Selected Fields** list, then select the parent field check box. For example, to display an parent field first in the table layout right after the Status column, select the first column.

- To change the order of fields in the table, drag and drop fields in the **Selected Fields** list. If the column you added is referenced by a list of values, make sure it is before the field with the list of values. See [Configure a Filter with a Dynamic Parameter](#).
- When you've ordered the columns to your liking, click **Done**.
The table header for the parent column uses the format "<field title> (<business object title>)" such as "Line Number (lines)".

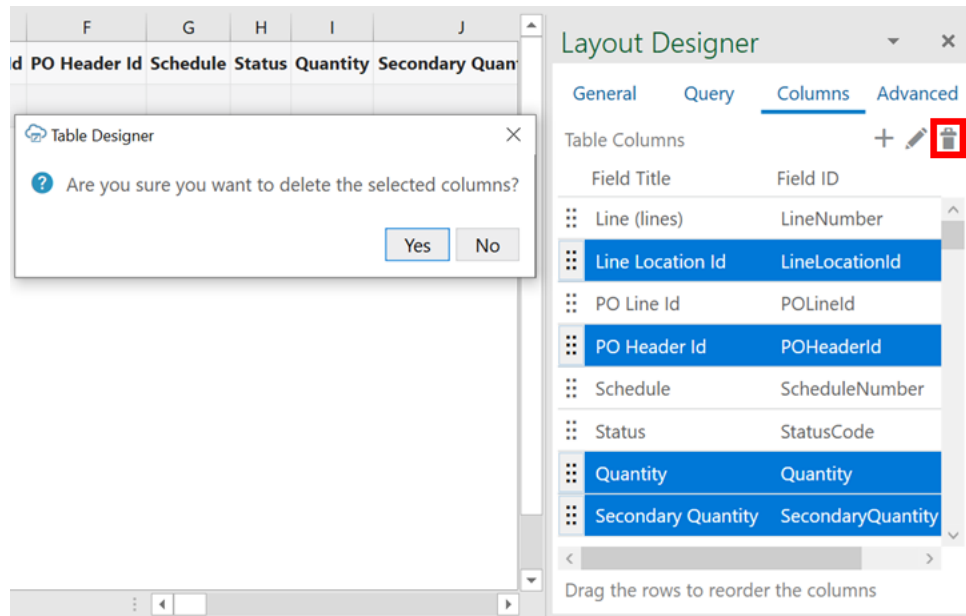
You can also reorder the columns in a Table layout by dragging and dropping columns in the Table Columns list in the Layout Designer.

 **Tip:**

Right-click a column in the list to see more options for reordering it.



To remove an ancestor column, select it from the list, then click the Delete the Selected Columns icon (🗑️). You can use the Ctrl and Shift keys to select multiple columns for deletion.



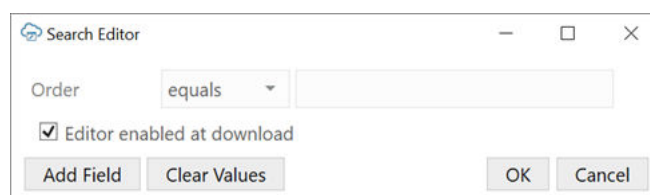
Filter Data for a Set of Dependent Layouts

You can create search and search parameter queries on a set of dependent layouts to determine which data get returned from the REST service when a business user invokes a download. There are two search features: a graphical Search Editor and a Search Parameter Editor.

Use the Search Editor to configure a search query that retrieves data for your set of dependent layouts. Use the Search Parameter Editor to define a separate search parameter query for each form and table in your set of dependent layouts. These search parameter queries further restrict the rows that are displayed when the business user invokes a download.

Take our example of a hierarchy where **purchaseOrders** is the parent, **lines** is the child, and **schedules** is the grandchild. In this scenario, you may have a Form-over-Table layout as the primary layout with **purchaseOrders** in the form and **lines** in the table. You also then have a subordinate Table layout for your **schedules** business object.

To show a single purchase order in the form, you would configure a search in the Layout Designer that prompts the user to enter an order number like this:



Without any other search parameters, Oracle Visual Builder Add-in for Excel populates the form with the user-provided purchase order, and the two tables with all available lines and schedules associated with this purchase order.

To limit the lines and schedules, you can configure search parameter queries on each table using the Layout Designer. For example, to show all schedules with the same transaction business category, create a search parameter for the schedules Table layout, such as `q=TransactionBusinessCategoryId=100`. On download, the add-in returns all schedules with the same transaction business category (in this case, with an ID of "100").

 **Note:**

Some query parameters may not produce the desired result on dependent layout download. For example, using a "order by" parameter will not work as expected since the add-in sends multiple separate requests for child resources. Parameters such as "order by" should not be used.

Refer to [Use Search to Find Required Data](#) and [Use Search Parameters to Limit Downloaded Data](#).

Download, Upload, and Clear Operations on Dependent Layouts

When you download, upload, or clear data for a layout in a dependent hierarchy, the operation takes effect on all layouts in the hierarchy, starting with the primary layout, progressing to the next layout in the hierarchy, and continuing down until the last level in the hierarchy.

If the layout is not part of a set of dependent layouts, the operation is performed on the active layout only.

Settings such as those for macros only apply to the primary layout and are not enforced on other layouts in the hierarchy.

 **Note:**

The "Download All/Stop Now" prompt also only applies to the primary layout. This prompt appears during download when the number of downloaded rows in the primary layout reaches the configured limit.

Each layout in the hierarchy uses the specific pagination settings, like Limit and Offset, from their respective business objects. For more information about pagination settings, see [Configure Pagination for a Business Object](#).

Downloading Data

On download, Oracle Visual Builder Add-in for Excel first checks all layouts in the hierarchy for any pending changes. If there are changes pending, the user is prompted to confirm the download operation. If the user chooses to proceed, all pending changes are lost.

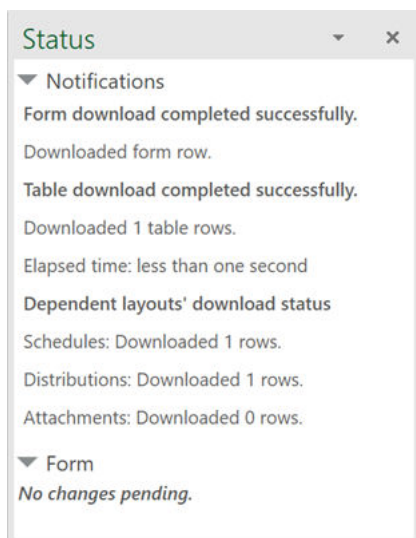
During download, the add-in first retrieves the values for the primary layout from the REST service. If there is a search query and/or search query parameters defined for the primary layout, the add-in returns only those values matching the criteria. After the primary layout is populated, the add-in makes the next worksheet in the hierarchy active and retrieves all the appropriate items. Again, if there are search parameters defined here, the add-in retrieves all matching values. See [Filter Data for a Set of Dependent Layouts](#).

The Download operation populates the "ancestor" column cells with the appropriate values. These cells are read-only.

All matching items for all rows from the parent layout are downloaded at each level. For example, when Sheet 1 in your workbook contains Purchase Orders as the parent and Lines as the child (containing, say, 10 Lines) and Sheet 2 contains Schedules as the grandchild, the Schedules table is populated with all Schedule items for all Lines. If each of the 10 Lines had two Schedules, the Schedules table would download 20 Lines.

The download operation proceeds through the rest of the Table layouts in the hierarchy, retrieving all matching items for all rows from the parent layout.

When the operation finishes, the primary layout becomes active and the Status Viewer shows results for the primary layout as well as a summary for each layout in the dependent hierarchy, as shown in this example for a download operation:



Following a download, you can edit data much as you would in a Table or a Form-over-Table layout.

Uploading Changes

On upload, the add-in makes the primary layout active and sends all updates. If the primary layout is a Form-over-Table layout, changes are sent first from the form and then from the table. The add-in then moves to the worksheet with the first dependent Table layout and uploads changes before proceeding to the next layout.

Pending changes may include creation of new items, update or deletion of existing items, and invocation of actions on items. For rows pending Update, values in the ancestor column cells are not uploaded.

For new items on layouts below the primary layout, values in a parent column must match a row in the parent layout. For example, to create a new distribution, you must specify an existing schedule in the parent column with which to associate the new item. Grandparent and higher columns are read-only and can't be updated. Empty parent column cells in the dependent layout or in its immediate parent layout result in creation failing.

The match is performed across all parent column cells using the local cell values from the parent table only. The service is not contacted while doing this matching. If one row in the parent table matches, it is used as the parent row. If more than one row matches, the first matching row is used. If no rows match, then the row is marked as "Create Failed".

When the operation finishes, the primary layout becomes active and the Status Viewer shows results for the primary layout as well as a summary for each layout in the dependent hierarchy.

Clear

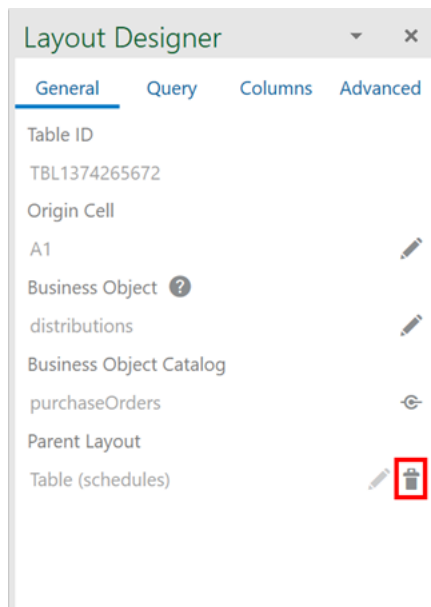
When the clear operation is invoked, data is cleared from all the layouts in the dependent hierarchy.

Delete a Dependent Layout

When your layout is part of a hierarchy of dependent layouts, the layout cannot be deleted without first removing its dependency in the layout hierarchy.

To delete a dependent layout:

1. Open the Layout Designer of the Excel worksheet whose layout you want to delete.
2. In the General tab, click the Remove Dependency icon (🗑️) next to Parent Layout.



3. When prompted, click **Yes** to remove the dependency.
4. Click **Delete Layout**, then confirm your selection.

Requirements for Dependent Layouts

To ensure that your dependent layouts function without error, Oracle Visual Builder Add-in for Excel requires that the REST service complies with the requirements set out here.

URL Path Requirements

To ensure all operations of dependent layouts can be done without errors, the add-in requires the following:

- **Parent business object:**
 - **Collection path:** `/parentResource`
 - **Item path:** `/parentResource/parentResource_Id`
- **Child business object**

- **Collection path:** `/parentResource/{parentResource_Id}/childResource`
- **Item path:** `/parentResource/{parentResource_Id}/childResource/{childResource_Id}`
- **Grandchild business object**
 - **Collection path:** `/parentResource/{parentResource_Id}/childResource/{childResource_Id}/grandchildResource`
 - **Item path:** `/parentResource/{parentResource_Id}/childResource/{childResource_Id}/grandchildResource/{grandchildResource_Id}`

This example shows the collection and item paths for the parent, child, and grandchild business objects in the following three-level hierarchy:

```

▼ PurchaseOrders
  ▼ lines
    ▶ schedules
  
```

Parent paths:

- **Collection path:** `/PurchaseOrders`
- **Item path:** `/PurchaseOrders/{PurchaseOrders_Id}`

Child paths:

- **Collection path:** `/PurchaseOrders/{PurchaseOrders_Id}/lines`
- **Item path:** `/PurchaseOrders/{PurchaseOrders_Id}/lines/{lines_Id}`

Grandchild paths:

- **Collection path:** `/PurchaseOrders/{PurchaseOrders_Id}/lines/{lines_Id}/schedules`
- **Item path:** `/PurchaseOrders/{PurchaseOrders_Id}/lines/{lines_Id}/schedules/{schedules_Id}`

GET and POST Response Requirements

GET and POST responses must contain self links that uniquely identify a record. For example:

```

"links": [
  {
    "rel": "self",
    "href": "http://localhost:8888/ords/hr_rest/ExpenseReports/15001"
  }
]
  
```

Notes on Oracle REST Data Services Support

- Support for Oracle REST Data Services (ORDS) requires version 22.1.0 or later. Previous versions of ORDS are known to have an issue with an incorrect payload definition for the POST handler. See [ORDS Release Notes 22.1.0](#).
- ORDS AutoRest does not provide service paths as described in this section. However, you can write custom ORDS using SQL and PL/SQL to satisfy these requirements. See

ORDS RESTful Web Services Architecture Diagrams and Manually Creating RESTful Services Using SQL and PL/SQL.

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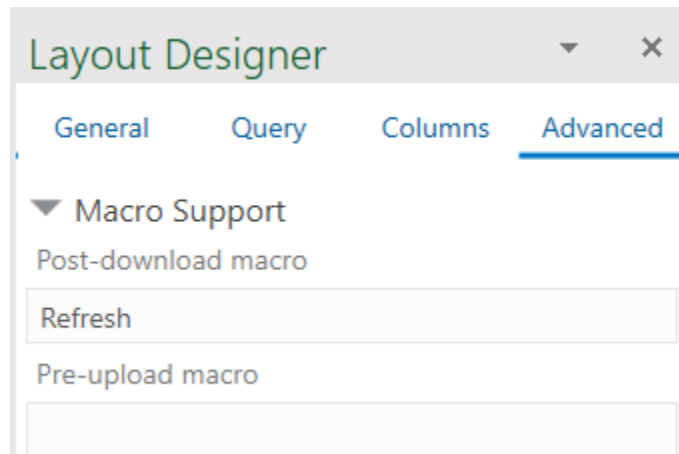
Use Macros in an Integrated Excel Workbook

You can configure macros that Oracle Visual Builder Add-in for Excel runs at specific points in the lifecycle of an integrated Excel workbook.

Use of this functionality requires you to use the Excel macro-enabled workbook type (.XLSM) and create your macros in a macro module. For more information about creating macros, see Microsoft documentation; describing how to create macros in an Excel workbook is outside the scope of this guide.

Some companies block the usage of Excel macros because they do not think macros are sufficiently secure. Consider your intended audience before you add a macro. You are also responsible for the security risks involved in using macros. So research the risks thoroughly before you deliver an integrated workbook to your customers. After creating a macro, take steps to protect the macro both from malicious and accidental alterations that might produce unexpected or harmful results. If a macro results in changes that are incompatible with the add-in or results in undesirable behavior, change the macro to avoid this behavior.

The Layout Designer's Advanced tab provides two properties where you can specify macros: the **Post-Download Macro** to run after download completes and the **Pre-Upload Macro** to run before an upload begins. Provide your macro names as the values of these properties. For example, when you've created a Refresh macro that you want to run after an upload, enter `Refresh` as the value of the **Post-Download Macro** property.



Tip:

Do not include the parentheses when specifying the name of the macro.

The macro that you specify for the **Post-Download Macro** property is not used if the user cancels download, if the table or form is empty, or in the event of an unexpected error. The macro that you specify for the **Pre-Upload Macro** property is used just before an upload. If the macro returns any value other than `true`, the upload operation quits and a notification appears in the Status Viewer. If the macro returns `true`, upload proceeds normally. To return

a true or false value from a macro, define a Boolean Function. See Microsoft documentation for details.

Here's example logic of an `IsUploadReady` function for a Pre-Upload Macro:

```
Function IsUploadReady() As Boolean
    Dim returnVal As Boolean

    On Error GoTo ErrHandler:

    Dim table As Range
    Set table = Sheets("Sheet1").Range("TBL349543489")
    ' The named range, TBL349543489, is managed automatically by the
    add-in

    returnVal = True

    Dim cRows As Long
    cRows = table.Rows.Count
    Dim currentTableRow As Long
    Dim amount As Long
    For currentTableRow = 2 To cRows ' start with 2 to skip header row
        amount = table(currentTableRow, 10) ' Amount is the tenth
column in the table
        If amount < 0 Then
            returnVal = False
            Debug.Print "Found negative amount = "; amount
        End If
    Next

    IsUploadReady = returnVal
    Exit Function

ErrHandler:
    Dim failureMessage As String
    failureMessage = Err.Description
    MsgBox failureMessage
    IsUploadReady = False
    Exit Function
End Function
```

When an error occurs during the execution of a macro, Excel displays a Microsoft Visual Basic window to the user. We recommend that you implement a robust error handling strategy so that the window displays a useful message to the user who encounters an error during macro execution. The following is a simplistic example. The appropriate error handling strategy for a given macro depends on the logic in the macro.

```
Sub Refresh()

    On Error GoTo ErrHandler:

    ActiveWorkbook.RefreshAll
    Exit Sub
```

```
ErrorHandler:
    Dim failureMessage As String
    failureMessage = Err.Description
    MsgBox "Unable to refresh. Details: " & failureMessage
    Exit Sub
End Sub
```

 **Tip:**

The add-in creates and maintains named ranges for the data table. Your macros should never modify these named ranges. However, your macros can access the named range to locate the data table on a dynamic basis.

 **Note:**

Macro recording is incompatible with add-in features such as download and upload and is not supported. Do not attempt to record any add-in features. In some cases, you may see unexpected exceptions.

Do not leave the Excel Visual Basic editor's break mode on when you use **Download Data** or **Upload Changes**. It is not supported and can result in an unexpected exception.

Publish an Integrated Excel Workbook

Once you complete configuring an Excel workbook, you can publish it for users who perform data entry. Publishing creates a copy of the workbook and prepares it for distribution; for example, it lets you hide the Design tools and turn on worksheet protection for each worksheet with a layout.

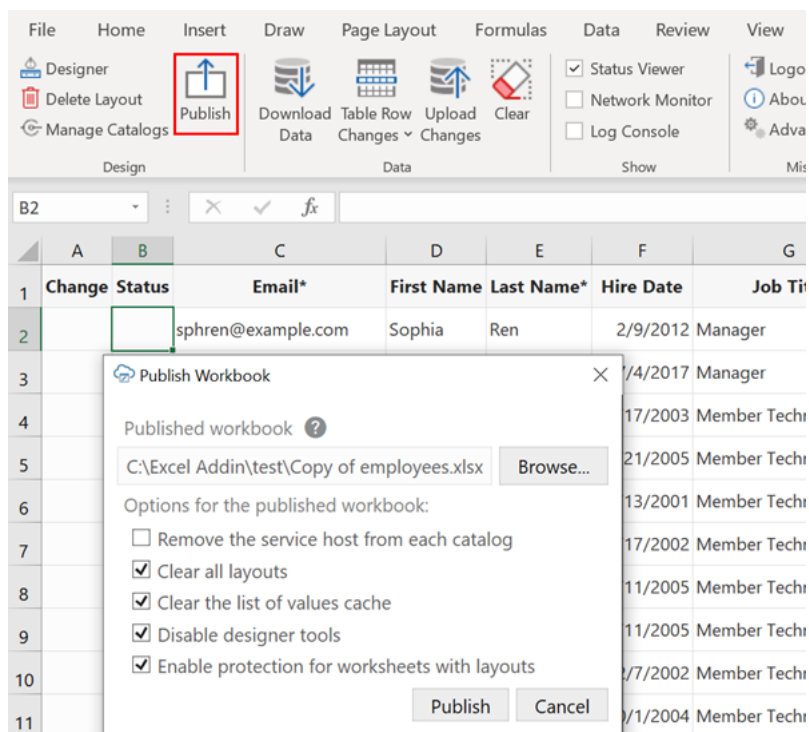


Note:

Publishing is optional. All data editing features of an integrated workbook are available in both published and unpublished copies of the workbook.

The recommended steps to take before you publish an Excel workbook are:

1. Complete configuration of the workbook.
2. Test the configuration thoroughly.
3. Use Excel's Inspect Workbook feature to review and remove personal information from the workbook.
Access the Inspect Workbook feature from Excel's File menu. When you use the Document Inspector to choose content to inspect and potentially remove, ensure that the Hidden Worksheets check box is not selected. You must not remove hidden worksheets from workbooks that you distribute because the add-in uses hidden worksheets to integrate the Excel workbook with the REST service.
4. In the Oracle Visual Builder tab, click **Publish**.



The Publish Workbook window opens. If the name of the original workbook ended with `-source` (for example, `employees-source.xlsx`), the add-in will offer the same name without `-source`.

5. To change the published workbook's directory and file name, enter the desired name and location in the Publish Workbook window, or click **Browse**. Make sure the published workbook doesn't use the same name as any open workbook (Excel won't let you use the same name for different workbooks, even if the file paths are different).
6. In the Publish Workbook window, choose other options for your published workbook:
 - If you want users to enter the service host when they open the published workbook, select **Remove the service host from each catalog**. This option lets users connect to another service host to access the REST service.

Note:

OAuth 2.0 properties are preserved when publishing the workbook
See [OAuth 2.0 Authorization Code Flow](#).

- Select **Clear all layouts** to clear data downloaded to each layout in the published workbook. This option lets users download the latest data from the REST service in the published workbook.
- Select **Clear List of Values Cache** to clear the list of values cache in the published workbook. This option is important if users might have different choices for a list of values in the published workbook.
- If you don't want users of the published workbook to modify its layout, select **Disable Designer tools**. This option hides the design tools in the published

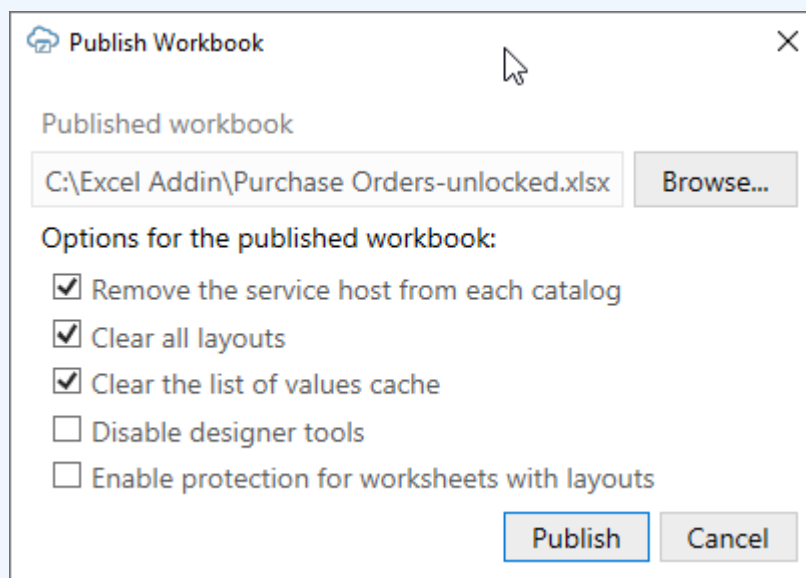
workbook. (If the add-in was installed with the design tools already disabled, this option has no additional effect.)

- If you want to prevent users from modifying read-only fields and performing Excel actions in the published workbook, select **Enable protection for worksheet with layouts**. This option enables Excel's worksheet protection for each worksheet with a layout.
7. Click **Publish**.
You'll see a notification in the Status Viewer that the workbook has been published to the specified directory.
 8. Save the source version of the workbook, in case you need to make configuration changes post-publication.

Now that your workbook is published, you can distribute it to users for data entry.

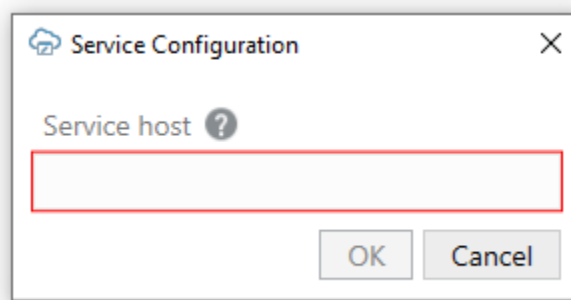
 **Note:**

If you are distributing a sample integrated workbook and expect the target audience to modify the configuration, you may want to publish a copy with these settings:



There are a number of differences with respect to the source workbook:

- If the service host value was removed for a workbook, users who open that workbook and perform an action that requires access to the REST service are prompted to enter the service host value, as shown here:

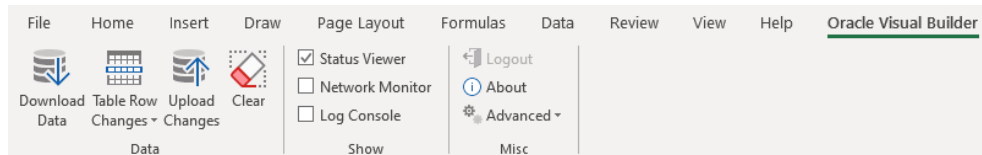


Actions that require access to the service include the Download Data and Upload Changes commands.

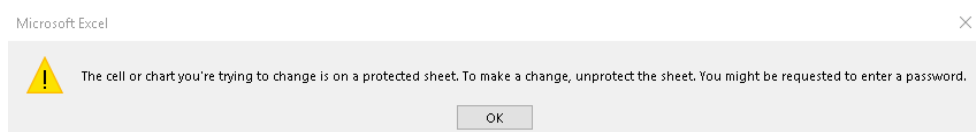
 **Tip:**

To change the URL of the service host when you don't have the Design tools installed, use the **Edit Service Host** option in the Advanced menu.

- If the Designer tools were disabled, tools such as the Designer, Delete Layout, and Publish do not appear in the Oracle Visual Builder tab, as shown here:



- If worksheet protection was enabled and a user tries to modify a read-only field, a message similar to the following image is shown:



Worksheet protection also prevents the user from performing Excel actions that might disrupt the workbook's integration with the service. See Understanding Read-Only Behavior in *Managing Data Using Oracle Visual Builder Add-in for Excel*.

REST Service Support

This chapter provides additional technical details about how Oracle Visual Builder Add-in for Excel supports integration with REST services. It also provides information about technical known issues and limitations.

Service Types

Oracle Visual Builder Add-in for Excel provides support for the following service types:

- [Oracle business object REST API services](#)
- [Oracle REST Data Services \(ORDS\)](#)
- [NetSuite SuiteTalk REST Web Services](#)
- [Other services](#)

Oracle Business Object REST API Services

Oracle business object REST API services provide rich service descriptions that Oracle Visual Builder Add-in for Excel can analyze to provide a business object catalog with many details already filled out.

Oracle business object REST API services include many services offered by Oracle Cloud Applications as well as custom business objects in Visual Builder. When the add-in integrates an Excel workbook with Oracle business object REST API services, it supports special features such as:

- [Graphical search editor](#)
- [Row finders](#)
- [Batch upload](#)
- [Polymorphic business objects](#)
- [Custom actions](#)
- [Upsert mode](#)
- [Business object hierarchies](#)

See [Accessing Business Objects Using REST APIs](#) and [Creating ADF RESTful Web Services with Application Modules](#).

Oracle REST Data Services

Oracle Visual Builder Add-in for Excel supports Oracle REST Data Services (ORDS) when you provide an OpenAPI description of an ORDS service. ORDS with AutoREST can provide an OpenAPI service description.

For example, use `http(s)://myhost.example.com:8888/ords/hr_demo/open-api-catalog/employees/` where:

- `myhost.example.com:8888` is the host and domain portion
- `hr_demo` is the schema/application
- `employees` is the database table

For information about AutoREST, see [Automatic Enabling of Schema Objects for REST Access \(AutoREST\)](#) in the *Oracle REST Data Services Developer's Guide*.

For manually-created REST services using ORDS, you'll need to define modules, templates, and handlers in order to get an OpenAPI service description. See [Manually Creating RESTful Services Using SQL and PL/SQL](#) in the *Oracle REST Data Services Developer's Guide*.

After importing an ORDS service description, you can use the Business Object Field Editor to provide additional information about each field to improve the overall user experience. For example:

- Edit the field titles
- Designate certain fields as required
- Define lists of values. See [Use Lists of Values in an Excel Workbook](#).

Known Issues with ORDS

Refer to these known issues when planning to use Oracle REST Data Services:

- In some cases, the ORDS server returns Create Failed for rows, when in fact the Create operation was successful. Re-downloading rows into the table will show the created rows.
- With an ORDS service, the PUT operation on the item path performs an "upsert" (see [Update/Insert Table Row](#) in *Oracle REST Data Services Developer's Guide*). So if you are about to update an existing row and someone else deletes that row, your update attempt may re-create that row. There's no warning or notice when this behavior occurs.

NetSuite SuiteTalk REST Web Services

Oracle Visual Builder Add-in for Excel provides limited support for integrating Excel workbooks with NetSuite SuiteTalk REST web services using Table layouts. Refer to this topic for more information on workbook and authentication requirements, as well as support limitations and known issues.

The NetSuite concept of a "Record" is roughly equivalent to the concept of "Business Object" used in this document.

For more information on NetSuite SuiteTalk REST web services, see [SuiteTalk REST Web Services Overview and Setup](#) in the *NetSuite Applications Suite* documentation.

To create a table layout for a NetSuite REST service, you need:

- An appropriate NetSuite URL for the service description (metadata)
- A config file with the OAuth2 settings for your account

See the following sections for details.

NetSuite Service Descriptions

NetSuite provides support for retrieving OpenApi3 service descriptions for NetSuite records available via REST. For example, to obtain the service description for "contact", use a URL similar to:

```
https://<YOURACCOUNT>.suitetalk.api.netsuite.com/services/rest/  
record/v1/metadata-catalog?select=contact
```

Note:

The add-in can retrieve and process the entire NetSuite catalog using `...services/rest/record/v1/metadata-catalog` (without `?select`). However, it is very large and takes a long time. So, selecting a specific record is recommended.

For information on OpenAPI 3.0 metadata with NetSuite SuiteTalk REST web services, see [Working with OpenAPI 3.0 Metadata](#).

Authentication

NetSuite REST services require OAuth2. In order to create a table layout for NetSuite, you need to select OAuth2 when in the first page of the wizard.

On the next page, import your NetSuite OAuth2 config file. If you don't have one, see the next section.

NetSuite OAuth2 Configuration Files

Here is a sample OAuth2 config file for NetSuite:

```
{  
  "type": "oauth2",  
  "authorizationCode": {  
    "clientId": "<value provided by your account admin>",  
    "authorizationEndpoint": "https://  
<YOUR_ACCOUNT>.suitetalk.api.netsuite.com/app/login/oauth2/authorize.nl",  
    "redirectionEndpoint": "<value provided by your account admin>",  
    "accessTokenScope": "rest_webservices",  
    "tokenEndpoint": "https://<YOUR_ACCOUNT>.suitetalk.api.netsuite.com/  
services/rest/auth/oauth2/v1/token"  
  }  
}
```

Copy this sample, paste it into a plain text file, then save it with a file name such as `NetSuite-OAuth2-Config.json`. You can then ask your NetSuite account admin to fill in the missing values and return it to you.

 **Note:**

If your NetSuite account admin needs some pointers on the missing values, see the next section.

You can now create a Table layout for NetSuite REST services. See [Create a Table Layout in an Excel Workbook](#).

Integration Records

If you have not yet created an appropriate NetSuite Integration Record to use with your integrated workbook, refer to [Integration Record Overview](#) and [Create Integration Records for Applications to Use OAuth 2.0](#) in the *NetSuite Applications Suite* documentation.

To support OAuth 2.0 authentication with the add-in, the integration record must have these configuration settings enabled:

- **Public Client** check box. This is required since the add-in is considered a public client.
- **REST Web Services** check box

 **Note:**

Make sure to capture the client ID during this process.

Once you have an appropriate integration record, it can be used with multiple different integrated workbooks that are integrated with NetSuite services that use this account.

For more information on how the add-in supports OAuth2, see [OAuth 2.0 Authorization Code Flow](#).

NetSuite Reference Fields

NetSuite records (or business objects) support a concept known as a "Reference Field" where a field in one business object can reference a row in a different business object. For example, the NetSuite "contact" record has a field called "company". The company field can refer to a customer, partner, vendor, and so on.

The add-in can work with NetSuite reference fields. However, some extra configuration is required.

When you create a catalog and table layout for "contact", the company field is missing initially (due to limitations in the service metadata). Here are the steps to add Company to your table layout:

1. Open the Business Object editor for "contact".
2. Click the Fields tab, then add a new field for company:
 - ID: company
 - Type: Object

- Subfields: Add two subfields of type string with ID values of "company/refName" and "company/id".

 **Note:**

Keep in mind that IDs are case sensitive and must match the NetSuite JSON member names exactly.

- Provide Title and Help Text values as desired.
3. Return to the table layout.
 4. From the Layout Designer, click the Columns tab, then click Manage Columns (+).
 5. From the Table Column Manager, add the subfields to the layout as needed. For example, you might find it useful to add the "company/refName" to your contact layout.

For more information about the contact record, see [contact](#) in *NetSuite REST API Browser: Record API v1*.

See also [Format of Selects and References](#) in the *NetSuite Applications Suite* documentation.

 **Note:**

There is no support for including additional fields from the referred record in the referring table. So, using the example above, you cannot include additional company (customer, partner, vendor, etc.) fields in the contact table.

Limitations

These NetSuite features are not supported by the add-in:

- Record actions
- Sublists are not supported. See [Working with Sublists](#).
- Subrecords are not supported. For example, for `/task`, you can't manipulate fields like contact, owner, transaction, and so on. See [Working with Subrecords](#).
- Transforming records
- Upsert operation

These add-in features are not currently available for integrated workbooks connected to NetSuite services:

- Form-over-Table layout or dependent layout hierarchies
- Refresh field titles
- Send only changed data

Known Issues

Feature Area	Issue	Description
Mandatory Properties	The add-in cannot properly set default values for the "Required for Update" and the "Required for Create" properties for a field.	The OA3 service description does not provide the "Required" property for schema members (fields). You can manually configure these properties using the Business Object Field Editor. See Configure Business Object Fields .
Data Download	Download performance is suboptimal.	A separate GET request is needed for each row because there is no way to get all fields for several rows in a single GET request. This limitation causes performance to suffer.
	The GET request for a single item does not include some of the expected fields in the response payload.	For example, "Last Sale Date" and "Opening Balance" in a "customer" business object.
	Query by Internal ID field returns an error	
Data Upload	Some fields in some NetSuite services do not accept a null value in a POST/PATCH request even though the service description describes them as "nullable".	Workaround: Review the error message details to identify the fields causing the error, then configure these fields to omit empty values from the payload. See Omit Empty Values During Upload .
	After a successful upload to add or update a row, the row's values in the layout does not reflect changes made on the server.	In this case, the response does not include the updated fields. The user will need to re-download to see any changes.
	When uploading Create/Update rows, the error message returned by the service is missing specific details.	You instead see a generic message such as "Error while accessing a resource. Field must contain a value." is returned without indicating which field it is.
	Conflict detection is not supported	If a user uploads changes to the service that overwrite another user's recent changes, the upload succeeds with no notification of the conflict.
Lists of Values	List of values are not configured automatically on business object fields.	Configure fields with list of values using a local data source. See Create a Local Data Source for a List of Values and Configure a List of Values with a Local Data Source .

Other Services

Oracle Visual Builder Add-in for Excel can also be used with other service types as long as the service behaves as the add-in expects.

When using another REST service, provide an OpenApi service description as you would for other service types. See [REST Service Support Limitations](#) for more information on the add-in's expectations for any service.



Note:

The graphical search editor is not available for these services but search parameters can be used. See [Use Search Parameters to Limit Downloaded Data](#).

Supported Data Types

The add-in supports a variety of data types exposed by business objects in web applications developed using Visual Builder and data types exposed by REST services.

The add-in supports the following OpenAPI data types (derived from the JSON Schema Specification). This table shows how OA3 (JSON) data types are mapped to the Data Type property for Business Object fields as shown in the Business Object Field Editor.

JSON Type	Business Object Field Data Type	Notes
boolean	Boolean	
integer	Integer	<code>integer</code> is defined as a JSON number without a fraction or exponent part.
object	Object	See the Subfields description in Configure Business Object Fields .
number	Number	
string	String	
string	Date-time	When the OA3 <code>format</code> property is "date-time"
string	Date(no time)	When the OA3 <code>format</code> property is "date"
array	n/a	Not supported

For OA3 properties with type "string", the following format values are explicitly unsupported:

- time
- binary
- byte
- long-text

Other format values are ignored and the field is mapped to the String data type.

The add-in ignores fields with unsupported data types when you create a Table layout or Form-over-Table layout in the Excel workbook. If, for example, a service that you use to retrieve data includes the `binary` attribute data type, the add-in ignores it and does not create a column in the data table for this attribute type.



Note:

File, text, and web page type attachments are supported. See [Create Layouts for Attachment Business Objects](#).

For more information, refer to the following OpenAPI and JSON resources:

- OpenApi: <https://swagger.io/specification/#dataTypes> and <https://github.com/OAI/OpenAPI-Specification/blob/main/versions/3.0.0.md#dataTypes>
- JSON: <https://datatracker.ietf.org/doc/html/draft-wright-json-schema-00#section-4.2>

Business Objects Harvested from OpenAPI Metadata

Oracle Visual Builder Add-in for Excel identifies business objects in an OpenAPI document primarily by examining the paths defined in the document.

The add-in creates a business object for each collection path defined in the OpenAPI document. A valid collection path:

- Does not end with a path parameter replacement token like `{department_id}`
- Defines `GET` and/or `POST` operations

Examples of valid collection paths are:

- `/Departments`
- `/Departments/{department_id}/child/Employees`

The add-in associates the collection path with any related paths. For example, the add-in associates an item path with a collection path if the path value is identical with the addition of a path parameter replacement token at the end. This comparison is case sensitive. An item path value of `/Departments/{department_id}` would be correctly associated with a collection path value of `/Departments`. In contrast, `/Departments` and `/departments/{department_id}` would not be associated with each other.

A business object is then defined by its collection path, item path (if present), and any other associated paths (custom actions, for example).



Note:

Certain paths may be ignored by the add-in depending on the service type.

Relationships between business objects are also determined by comparing the path information. A business object is considered a descendent of another business object if the collection path value starts with the collection and/or item path of another

business object. This comparison is case sensitive. A business object with collection path `/Departments/{department_id}/child/Employees` is a valid child of a business object with collection path `/Departments` and item path `/Departments/{department_id}`.

Required Fields

When a business object field is created from a service description, the initial values of the **Required for update** and **Required for create** properties are set based on the following OpenApi property:

- The **Required for update** value is determined by the request body schema of the PUT (or PATCH) operation for the item path, along with the OpenAPI [Required](#) array property.
- The **Required for create** value is determined by the request body schema of the POST operation for the collection path, along with the OpenAPI [Required](#) array property.

When these PUT/PATCH or POST operations are not available, the Required properties are set using the response body schema of the collection GET operation and the OpenAPI Required array property. If the OpenAPI Required array property is not present in a schema, the corresponding Required property defaults to `false`.

You can always edit the **Required for update** and **Required for create** values in the Business Object Field Editor. See [Configure Business Object Fields](#).

REST Operations

Table and Form-over-Table capabilities are enabled for GET, PUT, PATCH, POST, and DELETE operations as follows:

- Download is enabled if there is a GET operation on the collection path. Note that you must first download rows before you can perform operations on the item path. Therefore, GET on the collection path is a prerequisite for operations on the item path such as PUT, PATCH, or DELETE.
- Existing row updates are enabled if the item path has either a PUT or PATCH operation. For these operations, the add-in includes all data values from editable cells for the changed row(s) on upload, regardless of whether the data value was edited since download.
- Create new rows is enabled if the collection path has a POST operation.
- Delete existing rows is enabled if the item path has a DELETE operation.

Note:

Even if the business object supports an operation, you can still choose to disable a layout's capability by deselecting it in the Layout Designer's Advanced tab.

Natural Language Support

For every request that the add-in makes to the REST service, Oracle Visual Builder Add-in for Excel automatically adds the `accept-language` header.

By default, the value sent with the `accept-language` header is the language/culture code that Excel is currently configured to use. You can change the language as described in [Change the Add-in's Language](#).

Each REST service determines how and whether it will react to the `accept-language` header.

Object-typed Fields and Sub-fields

Oracle Visual Builder Add-in for Excel supports fields of type `Object`. These fields may expose sub-fields, also known as nested fields.

If, for example, you have an Employee business object with the following fields:

- First Name (type: String)
- Last Name (String)
- Address: (Object)
 - Street (String)
 - City (String)
 - State (String)
 - Zip (String)
 - GPS Coordinates (Object)
 - * Latitude (Number)
 - * Longitude (Number)
- Hire Date (Date)

In this example, the type of the Address field is `Object` and it contains sub-fields. Object fields should not be confused with arrays. In this example, an Employee has only one Address. The add-in does not support fields that are typed as arrays.

The add-in handles Object fields and their sub-fields in the following manner:

1. First, in the Business Object editor **Fields** tab, only the top-level fields are listed. In this example, the top-level fields are: First Name, Last Name, Address, and Hire Date. To edit the properties for sub-fields of Address, edit Address and find the Sub-fields list on the Field Editor window. The direct sub-fields for Address are Street, City, State, Zip, and GPS Coordinates. Since GPS Coordinates is of type `Object`, its field editor will show its sub-fields (Latitude, Longitude).
2. Next, when creating a Table layout from a business object's fields, the add-in promotes the sub-fields and creates columns for each (leaf) sub-field. This maintains a regular, rectangular structure for the table in the worksheet. So, the above example generates a table with these columns:
 - First Name

- Last Name
- Address / Street
- Address / City
- Address / State
- Address / Zip
- Address / GPS Coords / Latitude
- Address / GPS Coords / Longitude
- Hire Date

REST Service Support Limitations

Refer to these limitations when planning to integrate a workbook with a REST service using Oracle Visual Builder Add-in for Excel.

Caution:

Many different request and response schema types are possible and we cannot list all that are compatible with the add-in. If a particular structure is not listed explicitly as supported, it may not work.

- The add-in supports REST response payloads up to 1 billion characters in size.
- Only REST API services that return `application/json` media types as response payloads are supported. The add-in supports `application/octet-stream` for attachments. Other media types such as XML are not supported.
- Asymmetrical field lists. Since download, editing, and upload all occurs in the same Excel rectangular grid, the add-in counts on having a single set of field IDs (JSON member names) for both download and upload. If the REST service uses different field IDs for the same information when completing different operations, it cannot be used effectively with the add-in.
- Fields with forward slash (/) in the member name:
 - OpenApi documents contain schema properties that are represented in JSON as something like `"memberName" : { . . . properties describing the field ... }`
 - When creating the business object field from the JSON member, the add-in uses the member name as the field ID.
 - Field IDs that include the / character are incompatible with the add-in, so such members will not be represented as fields in the business object.
- URLs longer than 8000 bytes may fail due to limitations in various network devices between the add-in and the server.

If a REST service owner makes significant changes to the service after the workbook is configured to integrate with the service, the integration may not function as expected. In such cases, you can either re-import the service description and create a new layout, or refresh the business object catalog. If the change is minor, you can update the business object details to match the change in the service. See [Manage Catalogs and Business Objects](#).

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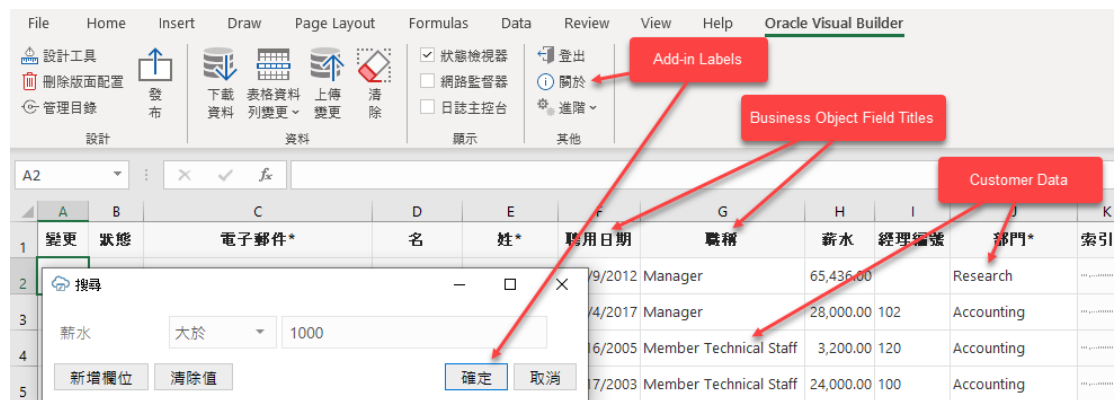
Internationalization

Oracle Visual Builder Add-in for Excel includes several features that support distributing your integrated workbook to other locales and in other languages.

These features include:

- A localized add-in
- Support for localized REST service text
- Support for translating the integrated workbook using JSON files

If a business user opens a integrated workbook in Chinese, the add-in displays all add-in labels such as icon labels, menu items, and buttons in the Chinese language. If the REST service has been localized into Chinese, the add-in retrieves and displays Chinese text for business object fields, service response messages, and so on.



If the workbook itself has been translated, the add-in can display Chinese text for strings such as business object fields that have not been translated in the service description, the form label in a Form-over-Table layout, and workbook's help text.

Add-in Localization

The add-in is available in over 30 languages. By default, it automatically detects the user's preferred language from Microsoft Excel and uses that language where possible. When a business user opens an integrated workbook in Excel, everything in the add-in is displayed in the desired language—from the Oracle Visual Builder ribbon's icon labels and menu commands to add-in windows such as the Status Viewer and the Network Monitor.

The date, date-time, and number formats used by the add-in are also culture-sensitive. These data format types depend on the business user's preferences as defined in the Windows region settings. So a US user will see US dates and a French user will see French dates. See [Appearance of an Integrated Excel Workbook](#).

REST Service Localization

The add-in also supports retrieving localized text from your REST service if the service supports it. Localized text strings include field titles, row finder names, custom action results, and error messages.

Every request the add-in makes to the service includes the `accept-language` header. The language setting specified for Excel is used for requests, including the describe requests that fetch the initial business object field titles.

Workbook Translations

The add-in also supports localizing text strings in the integrated workbook, such as business object field titles, variable names, and help text for fields and finders. See [Manage Workbook Translations](#).

Manage Workbook Translations

If you plan to distribute your integrated workbook in another language, you can extract the base language file from the workbook and send it for translation. This translation file includes workbook-specific text strings such as field titles and help text for you to translate into your target language.

Once translated, simply import translation files for each required language through the add-in. When you distribute your localized workbook to your business users, the add-in displays the translated strings if the preferred language is available.

About Translation Files

A translation file is a JSON file in Application Resource Bundle (ARB) format that stores the workbook's translatable strings for a given language. Each translatable string is stored in a key-value pair and includes additional attributes that help you and your translators understand the context.

Here's an example of an entry for a Business Object field, "First Name", in an Employees workbook:

```
"50689d80-c95c-4353-9032-cf4251d4abec.Title": "First Name",
"@50689d80-c95c-4353-9032-cf4251d4abec.Title": {
  "context": "layout: TBL731992735, business object: Employees,
field: firstName",
  "description": "The field title used as a column header or a
form label.",
  "source_text": "First Name"
},
```

The first line contains the translation key (`50689d80-c95c-4353-9032-cf4251d4abec.Title`) and translatable string value (`First Name`) separated by a colon. The key is a unique ID for the string in the workbook. The value is the string that your translator will translate into the target language, for example, "Prénom" for French.

Keep in mind that translation keys are different for each workbook. Two workbooks may have the same translatable string—say, "First Name"—but these strings will have different keys. For this reason, you can't share translation files between workbooks.

Each key-value pair also includes some additional attributes that help translators understand how to translate the text string: `context`, `description`, and `source_text`. The context and description provide information about where in the workbook the string is used.

The source text is the original value for the string in the base language. In the base language file, the source text is always the same as the value. In the translated files,

the value is translated but the source value remains unchanged. The source text value allows someone to inspect the translations and compare the strings easily.

The translation file also includes some global attributes (prefixed with @@) that apply to the translation file as a whole. Here is an example of the global attributes (locale, context, and last_modified) for an Employees workbook:

```
{
  "@@locale": "en-US",
  "@@context": "Integrated Excel Workbook: employees.xlsx",
  "@@last_modified": "2022-12-07T15:19:16.8664548-05:00",
```

The locale attribute provides the language code for the text strings stored in this file; in this case U.S. English (en-US). This is the value that you'll need to change to indicate the new language when you translate the file. For Brazilian Portuguese, you'd use the value "pt-BR". The locale attribute requires an IETF BCP 47 language tag.

On import, the add-in relies on the value of @@locale to identify the language for the translation file. The file name is not used for this purpose.

Translate Your Integrated Workbook

To translate your integrated workbook into another language, extract the workbook's translation file using Oracle Visual Builder Add-in for Excel and send it for translation. When you get the translated files back, import them into your workbook.

The extracted translation file only includes text strings that are currently used in your workbook's layouts. Field titles, variable names, and help text for fields and finders that are not in use are not included in the translation file. If you change the configuration of the workbook, extract the translation file again to pick up any new strings.

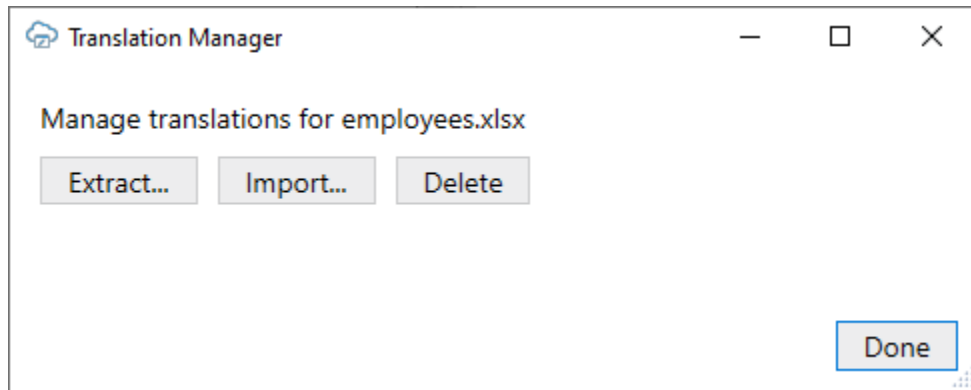


Note:

Fields included dynamically from polymorphic business objects are not included in the translation file.

To translate your workbook:

1. Open the workbook you want to translate.
2. Click the **Oracle Visual Builder** tab from the Excel ribbon.
3. Choose **Manage Translations** from the **Advanced** menu to open the Translation Manager.



4. From the Translation Manager, click **Extract** and save the translation JSON file to your local drive.
5. Submit the file to your translation team for translation.
When creating a translation file for a specific locale, your translators will translate the strings and set the locale for the file before sending it back.
6. When you get the translated files back, open the Translation Manager and click **Import**.
7. From the **Import Translations** dialog, navigate to the location of the translated file or files, then select them.
You can use the Shift and Ctrl keys to select multiple files for import.
8. Click **Open** to import the files.
9. Save and publish the workbook before distributing it to your business users.

 **Note:**

If business users have a different add-in language setting than the one used for the integrated workbook, they are prompted to redraw all layouts when they open the workbook for the first time. If they choose to redraw the workbook, any data and changes to the layouts are discarded.

Clearing all layouts when the language changes is recommended since some data, such as lists of values, may be language-sensitive. Downloading in one language and uploading in a different language may not succeed.

If they choose to skip the redraw, they can manually redraw the workbook later using either the **Clear Layout** or **Download Data** icons from the **Oracle Visual Builder** tab.

Change the Add-in's Language

You can change the language that the Excel add-in uses. Do this if you want to evaluate your integrated workbook with different languages.

To change the add-in language:

1. In Excel, click the **Oracle Visual Builder** tab.

2. Choose **Select Language** from the **Advanced** menu.
3. From the **Add-in Language** list that appears, select the language you want to use. The list displays the languages that the add-in supports.
4. Click **OK**.
5. Clear the embedded browser cache. See [Clear the Embedded Browser Cache](#).
6. Restart Excel to make your changes take effect.

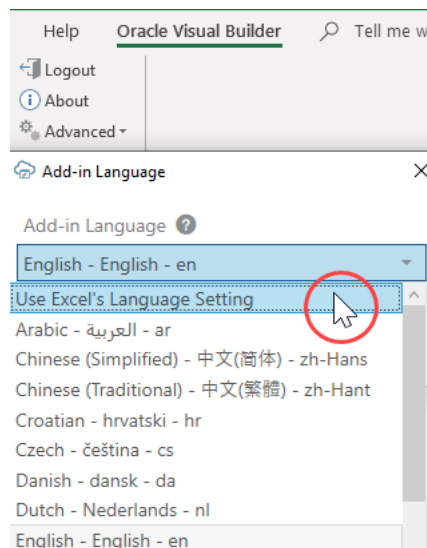
The add-in's user interface elements (**Download Data** and so on) now use the language you selected. If the workbook has been localized for the preferred language, the add-in uses that localization as well.

If the workbook is not localized but the REST service provides localized text in your language, the add-in can retrieve localized text based on your language setting. Use the **Refresh Field Titles** command to update your workbook.

If the preferred language uses a right-to-left writing system, the add-in's windows appear in right-to-left mode. The language that Excel uses remains unchanged, as does the format used for dates, times, and numbers. See [Excel or Windows options to change Excel's language and formats for dates, times, and numbers](#). See also [Natural Language Support](#).

During development, the add-in displays localized text for read-only property values in the design editors and dialogs. If a property is editable, the add-in displays the default language (or "base" language) value instead. When working in a language other than the base language, you may see localized values in some places and base values in others. When editing a property in the designers, you edit the base value. There is no change to the translated value already imported regardless of the current preferred culture.

The language that you choose for the add-in language is stored in a local file in the Windows user profile. You can select the **Use Excel's Language Setting** option in the Add-in Language drop-down list to remove this setting for the current user.



Refresh All Field Titles

You can refresh all field titles in your integrated workbook if, for example, you want to display field titles in another language.

 **Note:**

This feature is deprecated and will be removed in a future release.

Imagine, an invoices workbook was configured and tested with English as the current language, so all field titles are in English and this information is saved with the workbook. Now imagine this workbook was sent to someone in France for data entry. That person has Windows and Excel configured for French, and she would like to see field titles in French as well. Refreshing the field titles enables this data entry operator to see field titles in French.

When you refresh field titles, Oracle Visual Builder Add-in for Excel fetches the service description for each business object, if possible, and refreshes all of the business object's field titles. If a catalog has any business objects that are not used in a layout, the unused business objects are not refreshed. When it finishes, any affected layouts are redrawn automatically.

The add-in uses saved metadata path information to access the service description document. For older workbooks or catalogs with a service type of "other", the metadata path settings are empty. In this case, the add-in sets the metadata path to the default values for the service framework type before starting the refresh. These settings can be viewed from the **General** page of the **Business Object Editor**.

Before you begin, upload any pending changes to your workbook. If you don't, your pending changes will be discarded during the refresh.

 **Caution:**

A refresh wipes out any local changes made to field titles using the Business Object Field Editor. Make a backup copy of the workbook before performing a refresh of your field titles.

To refresh the field titles in your workbook:

1. In Excel, click the **Oracle Visual Builder** tab.
2. Choose **Refresh Field Titles** from the Advanced menu.
3. In the Field Titles window, click **Yes**.

If a service host is missing or you have not logged in, you'll be prompted to provide the required details. If you cancel either of these prompts, the refresh ends without completing.

When the refresh is complete, the add-in displays the results of the refresh in the Status window.

If the add-in is unable to fetch the service description for a given business object, the business object is skipped and the details are logged. To troubleshoot the error, open the log console and repeat the process to discover the cause. See [Log Console](#).

If the error is caused by incorrect or missing path details, consult with the REST API owner and update the path information, including the base path and metadata path settings, as required. See [Manage Metadata Path Information](#).



Note:

When the add-in fetches the service description from the metadata path, it includes the `accept-language` header as described in [Natural Language Support](#). A given service may or may not have translations for the requested language. For any missing translations, contact the owner of the service.

Oracle REST Data Services (ORDS) do not provide localized service descriptions.

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Security

When using Oracle Visual Builder Add-in for Excel, refer to this topic for security information including security-related best practices and recommendations.

Security Guidelines

Follow these best practices:

- Update the add-in to the latest version available.
- Restrict access to Excel documents containing sensitive data.
- Consider adding passwords to workbooks to further reduce exposure.
- Always use HTTPS endpoints instead of HTTP.
- Do not use basic authentication.
- Ensure that the latest Windows updates and security patches have been applied to the computers where you install the add-in.
- Disable deprecated transport layer protocols, such as SSL, TLS 1.0, and TLS 1.1. Refer to [KB5017811—Manage Transport Layer Security \(TLS\) 1.0 and 1.1 after default behavior change on September 20, 2022](#) on the Microsoft Support site.
- Consider using Excel's Inspect Workbook feature (available on Excel's File menu) to review and remove personal information from the workbook before you distribute it. When you use the Document Inspector, make sure the Hidden Worksheets check box is not selected. You must not remove hidden worksheets, because the add-in uses hidden worksheets to integrate a workbook with the REST service.

Microsoft Components

Oracle Visual Builder Add-in for Excel relies on a number of Microsoft technologies. These Microsoft technologies are subject to Microsoft's privacy policies and other Microsoft terms.

By installing and using this add-in, you are agreeing to those policies and terms and this add-in's direct or indirect usage of these technologies. See the [Microsoft Privacy Statement](#).

See also [Software Dependencies](#).

Authentication Options

At log in, the add-in uses the catalog's authentication setting to determine how to log in.

The add-in supports five authentication options:

- **Default:** At login, the add-in pings an Oracle Cloud Application anti-CSRF servlet endpoint. If the ping succeeds, Oracle Fusion Applications Token Relay is used. If the ping fails, Basic authentication is used instead.
- **Basic Access Authentication:** See [Basic Authentication](#).

- **Oracle Fusion Applications Token Relay:** See [Oracle Fusion Applications Token Relay Authentication](#).
- **OAuth 2.0 Authorization Code (PKCE):** See [OAuth 2.0 Authorization Code Flow](#).
- **No Authentication:** There is no prompt for credentials. No authentication-related headers are added to requests.

You can choose an authentication method when creating a new catalog. You can also change it later.

For information about how to configure your authentication settings, see [Set an Authentication Method for a REST Service](#).

Basic Authentication

Oracle Visual Builder Add-in for Excel supports basic authentication.

- When a catalog is configured to use Basic Access Authentication, the business user is prompted for basic credentials before the first request is sent to that catalog's endpoints. See [Authentication Options](#).
- The add-in sends the user credentials in the Authorization header for REST requests to the endpoint. See [RFC 7617](#) for more information.
- When used with HTTP, basic authentication is not secure. Basic authentication should only be used with HTTPS, and preferably only in non-production environments.
- Valid credentials for a given service using Basic authentication may be different from valid credentials for Token Relay.

Oracle Fusion Applications Token Relay Authentication

Oracle Visual Builder Add-in for Excel supports authentication for REST services exposed by Oracle Cloud applications that use the Oracle Fusion Applications Token Relay servlet. Refer to this topic for technical details on the Token Relay authentication mechanism.

The add-in uses an embedded web browser control to host the login interaction sequence between the workbook user and the Fusion Application (FA) authentication provider. During a successful login, the add-in captures the necessary authentication tokens and then uses them with subsequent REST requests. In particular, the access token is sent using the Bearer authentication scheme in the Authorization header. For more information, see [RFC 6750](#).

What Happens During the Login Sequence?

The add-in performs the authentication process just prior to any business operation initiated by the business user that requires access to the REST service. The add-in uses the following endpoints to obtain the authentication token:

- The UI home page: for example, `https://my-service-host/fscmUI/faces/FuseWelcome`.
- The Anti-CSRF endpoint: for example, `https://my-service-host/fscmRestApi/anticsrf`.

- The token relay servlet endpoint: for example, `https://my-service-host/fscmRestApi/tokenrelay`.

The Login Sequence Starts in the Embedded Browser

1. The add-in displays a modal pop-up login window that contains an embedded browser control, and directs the browser control to navigate to the UI Home Page URL. See [Embedded Browsers](#).
2. Since the business user has not yet successfully logged in, the browser is redirected to a page with a login form. This form typically contains user name and password fields and a Submit button.
3. The login user interface pages are controlled by the FA environment. There could be multiple steps involved, such as SSO, multi-factor authentication, and so on.
4. Each time a user's gesture or login page logic causes a page navigation event in the browser, the add-in's event handler is notified and the add-in performs an authentication test (see [Authentication Test](#)) to see whether the user has logged in.
 - If the user has successfully logged in, the login sequence is complete. The add-in automatically closes the login window and can continue with the REST request that triggered the login sequence using the harvested authentication tokens.
 - If the user has not yet logged in, the login window remains visible and the add-in continues listening for page navigation events.
 - If the user closes the login window before logging in successfully, the operation that initiated the authentication process is canceled.

Authentication Test

The add-in watches for page transitions in the embedded browser and performs a test to see if the user has successfully logged in. If, using the cookies from the embedded browser, the add-in can obtain a token from the Token Relay servlet, then the user has successfully authenticated.

Details about the test:

1. When each page navigation event is raised from the browser, the add-in attempts to get an anti-CSRF token by making a GET request to the anti-CSRF endpoint. This step is skipped once an anti-CSRF token is obtained.
2. The add-in then makes a GET request to the Token Relay servlet endpoint. If the request is denied, the test fails; Otherwise, on a 200 OK with a response payload of content-type `application/json`:
 - a. The payload is parsed and validated. The `token_type` member must have the value "JWT" and the `access_token` member must be present and non-empty.
 - b. The value for `access_token` is captured in memory and used for subsequent REST requests.
 - c. If the parsing succeeds, the test is considered to have passed. The login window is closed, and the target REST request continues.
 - d. Otherwise, the test is considered to have failed and the login window remains open.

Variations

1. If the authentication method in the service catalog of the integrated workbook is configured to be "Default", an initial ping request to the anti-CSRF endpoint is made before the login sequence begins.
 - a. If the request returns a 404 or other error, then the add-in abandons the Token Relay authentication mechanism. This means it falls back to using Basic authentication.
 - b. If the request returns a 200, with content-type `application/json`, and the payload contains a non-empty `xsrftoken` member, then the add-in proceeds with the login sequence.
2. If the authentication method property in the service catalog of the integrated workbook is configured to be "Oracle Fusion Application Token Relay", the initial ping to the anti-CSRF endpoint is skipped. The ping occurs later during page navigation.

Requirements

- The UI Home Page must be protected in such a way that an unauthenticated request in a browser redirects the browser and initiates a login sequence by redirecting to a login page.
- The `/anticsrf` endpoint should allow anonymous ("unauthenticated") access. The response payload must contain the token in the `xsrftoken` member.
- The `/tokenrelay` endpoint must be protected so that only authenticated users, identified by cookies issued during the browser login sequence, may access it. The response payload must contain a `token_type` member which must have the value "JWT" and also a `access_token` member, which must be non-empty. See [RFC 7519](#) for more information.
- Oracle Fusion Applications Token Relay is only supported for Oracle Cloud Application deployments that include standardized `/anticsrf` and `/tokenrelay` endpoints with standardized payloads. This behavior is not configurable at this time.
- Token Relay is not supported for other service types such as ORDS or Visual Builder Business Object (VBBO).

OAuth 2.0 Authorization Code Flow

Oracle Visual Builder Add-in for Excel supports authentication for REST services using OAuth 2.0 Authorization Code flow with Proof Key for Code Exchange (PKCE).

This authentication method allows clients like the add-in to authenticate and get an access token which can then be used to make REST requests to service endpoints.

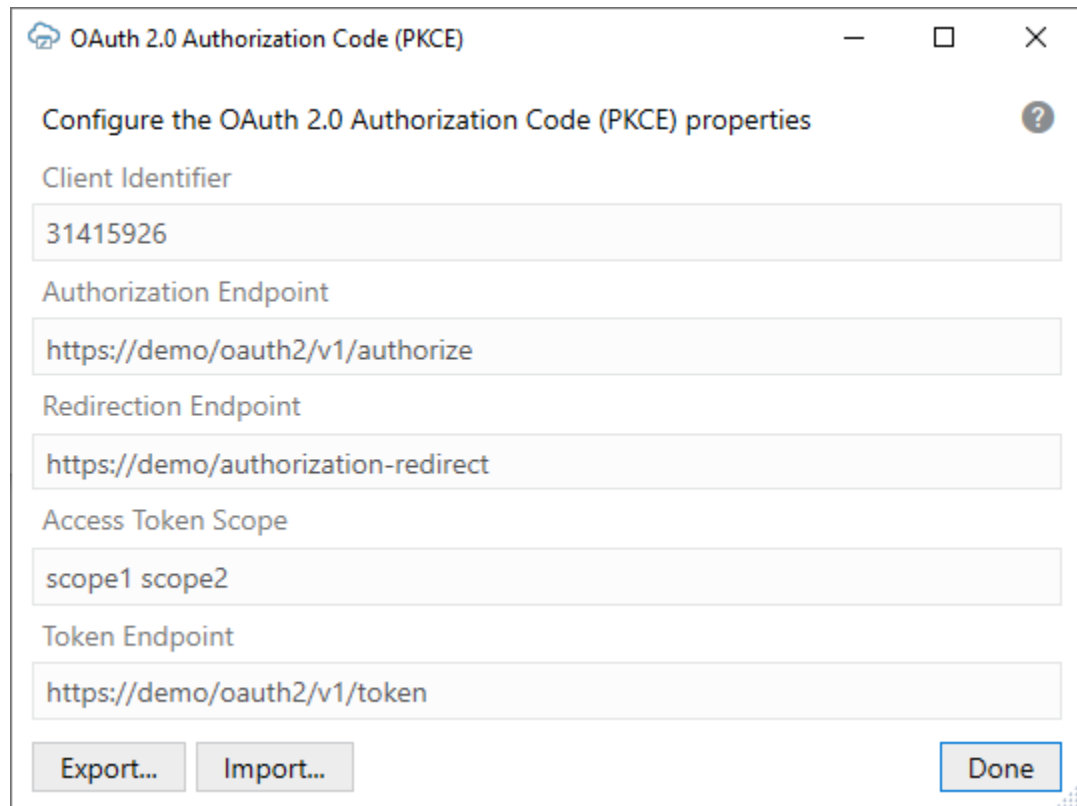
The OAuth 2.0 Authorization Code flow is supported by Visual Builder Business Object services, for example.

Refer to [Authorization Code Grant](#) for information on authorization code flow. See also [Proof Key for Code Exchange by OAuth Public Clients](#) for information on PKCE.

OAuth 2.0 Authorization Code Flow Configuration

In order to configure your workbook to use OAuth 2.0 Authorization Code flow, you'll obtain a client identifier from the security administrator for the service you are using. You'll also need to provide other details such as required endpoint URLs. Consult with the REST service owner for help.

You'll enter these properties in the OAuth 2.0 Authorization Code (PKCE) screen available when you choose OAuth 2.0 authentication for your catalog. This screen is shown here:



The screenshot shows a dialog box titled "OAuth 2.0 Authorization Code (PKCE)". The dialog contains the following fields and buttons:

- Client Identifier:** 31415926
- Authorization Endpoint:** https://demo/oauth2/v1/authorize
- Redirection Endpoint:** https://demo/authorization-redirect
- Access Token Scope:** scope1 scope2
- Token Endpoint:** https://demo/oauth2/v1/token
- Buttons:** Export..., Import..., and Done.

- **Client Identifier:** The identifier set up for the add-in to use when executing the authorization flow. Obtain this value from the security administrator for your service.
- **Authorization Endpoint:** The authorization server endpoint used by the client to obtain authorization from the resource owner via user-agent redirection.
- **Redirection Endpoint:** The client endpoint used by the authorization server to return responses containing the authorization code to the client using the resource owner user-agent.
- **Access Token Scope:** The authorization and token endpoints allow the client to specify the scope of the access request using the "scope" request parameter.
- **Token Endpoint:** The authorization server endpoint used by the client to exchange an authorization grant for an access token, typically with client authentication.

For more information on these properties, see [OAuth 2.0 Authorization Framework](#).

 **Note:**

The add-in does not require the Client Secret.

To configure your workbook for OAuth 2.0, click **Export** to save a blank JSON file with the required properties to your local drive. You can then provide this file to the service owner to fill in.

Here is an example of the JSON file showing sample values:

```
{
  "type": "oauth2",
  "authorizationCode":
  {
    "clientId": "31415926",
    "authorizationEndpoint": "https://demo/oauth2/v1/authorize",
    "redirectionEndpoint": "https://demo/authorization-redirect",
    "accessTokenScope": "scope1 scope2",
    "tokenEndpoint": "https://demo/oauth2/v1/token"
  }
}
```

When you get the JSON file back with the required values, simply click **Import** to import the file to the add-in.

You configure this authentication method for a new workbook when you create a catalog. During the new layout setup process, you'll be prompted to provide authentication details when you select "OAuth 2.0 Authorization Code (PKCE)" from the **Authentication** list. See [Create a Form-over-Table Layout in an Excel Workbook](#) or [Create a Table Layout in an Excel Workbook](#).

You can also configure authentication details for an existing catalog from the **Advanced** page of the **Business Object Catalog Editor**. When you select this authentication method from the **Authentication** list, click **Edit Authentication Flow Properties** to access the OAuth 2.0 Authorization Code (PKCE) screen. See [Set an Authentication Method for a REST Service](#).

Details of the Authorization Flow

The authorization flow follows these steps:

1. The add-in starts the login sequence by validating the OAuth2 configuration properties. If the properties are valid, the flow proceeds. If the properties are missing or otherwise invalid, then the login attempt is aborted and an error is reported. For example, an endpoint property that is not an absolute URL is invalid and results in an aborted login.
2. The add-in constructs a Uniform Resource Identifier (URI) using the Authorization Endpoint property, along with Client Id and other values saved in the **OAuth 2.0 Authorization Code (PKCE)** screen.
3. The add-in displays the login browser window and instructs the browser to navigate to that authorization Uri. See [Embedded Browsers](#).

4. The add-in watches for page transitions and redirects in the browser. All other browser and user interactions are governed by the logic and configuration of the authorization server.
There could be multiple pages and steps necessary for the user to provide credentials, get consent, and so on.
5. When the authorization server redirects the browser back to the Redirection Endpoint, the add-in closes the browser.
If the Redirect indicates an error, the add-in reports it and aborts the login flow. On a successful redirect, the add-in performs some validation on the returned values. If that succeeds, the add-in proceeds with the flow.
6. After a successful redirect, the add-in harvests the authorization code and sends it, along with other key values, in a POST request to the Token Endpoint.
The Token Endpoint returns an access token, which the add-in then includes in the Authorization header using the Bearer scheme, when making subsequent REST requests.

Limitations and Known Issues

- PKCE support is required. See [RFC 7636](#).
- There is currently no support for token Refresh logic.
- For the first step in the OAuth2 flow, the `code_challenge` is set using `code_challenge_method=S256`. "Plain" is not supported.

Service Authorization and User Privileges

In addition to authentication ("who am I"), REST services often enforce authorization ("what am I allowed to do") on every service request (GET, POST, PATCH, and so on). REST services may require business users to have specific privileges in order for them to view and update data.

Oracle Visual Builder Add-in for Excel does not have access to the user identity or any kind of privilege/role/authorization information and can't check authorization prior to an operation. Instead, it is the service that enforces authorization and returns an error if the current user is not authorized to perform the requested operation.

If the workbook is configured to allow an operation the business user is not authorized for, the user may see an error such as an 403 `Forbidden` error. For these cases, the business user should follow up with the REST service owner or system administrator in order to be granted the appropriate privileges.

Transport Layer Security

When the add-in connects to a REST endpoint using HTTPS, the add-in relies on the system default behavior for Transport Layer Security (TLS) to determine which TLS protocol is to be used.

Because the add-in runs within the Excel process, it cannot rely entirely on the .NET Framework 4.8 default setting to do this. To ensure that the system default behavior is in effect, the add-in sets the `AppContext.DontEnableSystemDefaultTlsVersions` property to false for the current app domain.

See the following Microsoft documentation:

- [If your app targets .NET Framework 4.7 or later versions](#)

- [Configuring security via AppContext switches \(for .NET Framework 4.6 or later versions\)](#)

The Digital Certificate

The artifacts that make up the Oracle Visual Builder Add-in for Excel are signed with a digital certificate. The digital signature proves the authenticity of these artifacts and verifies the identity of the publisher, Oracle. Digital signatures are created using certificates issued from trusted certificate authorities.

Certificates are used to sign artifacts during the product build process. All "sign-able" artifacts are signed starting with the installer (MSI) file and including all the DLLs that make up the add-in.

Note:

This topic provides the procedures in Windows Explorer to view and install the certificate as well as copy the certificate's public key. Be aware that the steps may be different for different editions and versions of Windows. Check the documentation for your version of Windows for more information.

Can I inspect the certificate?

You can inspect these certificates before and after installation to verify the authenticity of the add-in's artifacts.

To do so, navigate to the installer file (`vbafe-installer-all-users.msi` for the all-users installer), open the Properties window, then select the Digital Signatures tab.

Caution:

If the Digital Signatures tab is missing on the installer, discard the file. It may not be authentic.

Expired Signatures

An expired certificate doesn't mean that the signature is invalid. A properly timestamped signature remains valid well after the "valid from/to" date range shown in the certificate.

To get the latest certificate, upgrade to the latest available version of the add-in.

Trusted Publishers

Microsoft Excel offers an optional trust center setting called **Require Application Add-ins to be signed by Trusted Publisher**.

To use this feature, install the certificate:

1. From the Digital Signatures tab, select the signature from the Signature list and click **Details**.

2. From the Digital Signature Details dialog, select the General tab, then click **View Certificate**.
3. From the General tab of the Certificate dialog, click **Install Certificate...**
4. From the Certificate Import Wizard, choose either **Local Machine** for the all users installer or **Current User** for the current user installer.
5. Click **Next**.
6. Select **Place all certificates in the following store** and then click **Browse**.
7. From the Select Certificate Store dialog, select "Trusted Publisher" and then click **OK**.
8. Click **Next**, then **Finish** to close the wizard.

The certificate now appears in Excel's Trust Center.

Please consult Microsoft documentation for more information.

The Public Key

To get a copy of the public key associated with the add-in's digital certificate:

1. From the Digital Signatures tab, select the signature from the Signature list and click **Details**.
2. From the Digital Signature Details dialog, select the General tab, then click **View Certificate**.
3. From the Certificate dialog, select the Details tab, then select Public Key from the list.
4. Click **Copy to file...**
5. Follow the instructions in the Certificate Export Wizard.

The Add-in's Certificate Update Cycle

Oracle acquires a new digital certificate approximately every two years. Once available, subsequent releases of the add-in are signed with the new certificate.

If you have installed the certificate and public key previously, you may need to repeat that process after you upgrade to a new version of the add-in signed with a new certificate.

Troubleshoot Excel Workbooks

If you experience issues with Oracle Visual Builder Add-in for Excel, follow the steps here to identify and resolve issues. If you still can't resolve your issue, contact [Oracle Support](#).

- Review the documentation to make sure the desired operation is supported.
- Download and run the [Client Health Check Tool](#).
- Make sure you're on a [supported platform](#).
- Upgrade to the [latest version](#) of the add-in.
- Apply available [Microsoft updates](#).
- Close all workbooks, exit Excel, and try again with simple steps.
- Generate an add-in log for review. See [Logging](#). If you contact Oracle Support, you may be asked to provide this log.
- Generate a diagnostic report if required. See [Diagnostic Report](#).
- If you are having an issue with a login page, try clearing the browser cache. See [Clear the Embedded Browser Cache](#).
- If some **Oracle Visual Builder** ribbon commands are disabled after you open a workbook, check the Workbook Info window for details on the issue. See [Resolve Workbook Issues](#).

Note:

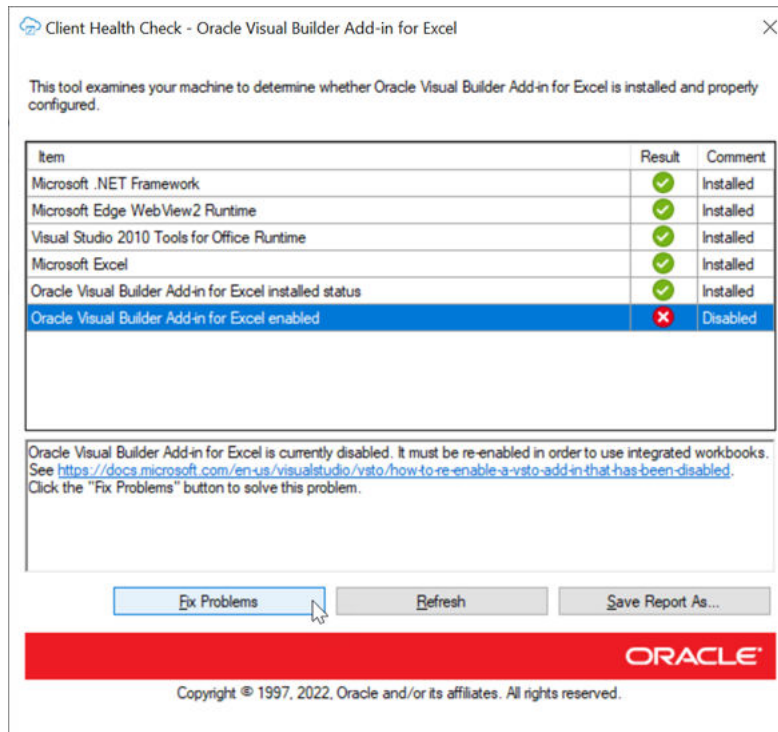
If you are experience network issues such as "bad request" errors during normal operations, there may be an issue with the REST service. Contact the owners of the REST service to determine whether the service is providing the expected response. You can use the Network Monitor to capture details of the request-response pairs to share with the REST service owners. See [Network Monitor](#) for the steps.

Check Your Environment

Run the Client Health Check Tool to check if the desktop configuration and environment are suitable for Oracle Visual Builder Add-in for Excel and to resolve issues.

Download the latest version of the Client Health Check tool (`vbafe-health-check.exe`) from the Oracle [Downloads](#) page.

1. Run `vbafe-health-check.exe` and review the result for each examined item.



Select each failed item (✗) for more details, including the steps necessary to resolve the issue. If the add-in can resolve the issue, the **Fix Problems** button is enabled.

Note:

The Client Health Check tool may also show warnings (⚠) if it finds something that is not optimal. You don't have to resolve warnings in order to use the add-in but it is recommended. Select each item with a warning to display information on how to resolve the warning.

2. Click **Fix Problems** if available or follow the instructions to resolve the issue.
3. If Oracle Support requests a copy of the report:
 - a. click **Save Report As...** and choose a name and location for the report.
 - b. Review the report and remove any sensitive information.
 - c. Send the report to Oracle Support.

Apply Microsoft Updates

When troubleshooting issues with Oracle Visual Builder Add-in for Excel, we recommend first applying all pending updates for Windows and Excel before reproducing the issue. A Microsoft patch may resolve your problem.

1. From the Windows Start menu, select **Settings, Update & Security**, and then **Windows Update**.
2. If updates are available on the Windows Update page, review the updates and click **Install Now**.

 **Note:**

The details of applying Windows updates can vary from version to version and also according to your company's IT policy. Check with your system administrator for assistance, if needed.

Network Monitor

Use the Network Monitor window to inspect the content of REST service calls between your Excel workbook and the REST service if you encounter unexpected behavior.

The Network Monitor window provides information such as the start time, the elapsed time, and response for each REST call that originates from the workbook. In addition, it provides the headers and payloads of each request sent from Oracle Visual Builder Add-in for Excel and the corresponding response from the service. The window shows up to 100 request-response events. Older events are discarded as new ones are added.

If you encounter issues with the REST service such as "bad request" errors, you can capture information about the error in the Network Monitor window and share this information with the owner of the REST service.

The Network Monitor window generally goes to the background while you perform the steps of your use case. Bring the window forward to see the details of each request and response.

1. In Excel, click the **Oracle Visual Builder** tab.
2. Select **Network Monitor** to open the Network Monitor window.
3. Repeat the steps that led to the issue.

The screenshot shows the Network Monitor application window. At the top, there is a filter box and 'Save...' and 'Clear' buttons. Below is a table with columns: Start, Elapsed (ms), Method, Request URL, and Response. One entry is highlighted in blue: Start: 6/13/2022 11:31:57 AM, Elapsed (ms): 1040, Method: POST, Request URL: /ic/builder/design/, Response: 400: Bad Request.

Below the table, the details for the selected request and response are shown in two panes:

Request Details:

```

Method: POST
Headers:
User-Agent: Oracle VBAFE (3.2.0.24759) .NET
Authorization: Basic (value redacted)
Accept: application/vnd.oracle.adf.resourceitem+json, a
REST-Framework-Version: 6
accept-language: en-US
Content-Type: application/json; charset=utf-8
Content-Encoding: gzip
Host: [redacted]
Content-Length: 146
Accept-Encoding: gzip
Request Body:
{
  "email": "otuvault@example.com",
  "firstName": "Oliver",
  "lastName": "Tuvault",
  "hireDate": "2007-11-23",
  "jobTitle": 3,
  "salary": 70000,
  "managerId": null,
  "department": null
}

```

Response Details:

```

WebException:
ProtocolError: The remote server returned an error: (
Response: 400: Bad Request
Headers:
Connection: keep-alive
X-AppBuilder-Build-Number: 931a796201950ba5d0d43bc8c2
X-ORACLE-DMS-ECID: [redacted]
Access-Control-Expose-Headers: X-appbuilder-client-ic
vb-ramp-actual-status: 400
X-ORACLE-DMS-RID: 0
Content-Encoding:
X-appbuilder-client-id: [redacted]
X-FRAME-OPTIONS: SAMEORIGIN
Vary: Accept-Encoding
REST-Framework-Version: 6
Content-Length: 153
Cache-Control: no-cache, no-store, must-revalidate
Content-Type: application/json
Date: Mon, 13 Jun 2022 15:31:58 GMT
Set-Cookie: JSESSIONID= (value redacted)
Response Body:
{
  "title": "Bad Request",
  "status": "400",
  "o:errorDetails": [
    {
      "detail": "Provide a valid value for Department."
      "o:errorCode": "27014",
      "o:errorPath": "/department"
    }
  ]
}

```

4. Select each request and response line from the upper table to display more details on the request and response in the panes below.
5. To save the details of a request and response, select an entry for a REST service call in the upper table, click **Save**.

⚠ Caution:

Request and response payloads may include sensitive information, including actual data and personally identifiable information. Be sure to handle these payloads with due care.

Installation Logs

The Oracle Visual Builder Add-in for Excel installer is a Windows installer that produces standard Microsoft Windows installer logs. If you are having trouble installing Oracle Visual Builder Add-in for Excel, you can generate and view an installation log file.

To generate an installation log file, run the installer from the command line and include `/log <log file path>`. See [Run the Installer from the Command Line](#).

Add-in log files may include some personal information from the user's computer including, but not limited to, the computer's name and the end user's Windows profile name. When uploading files with personal information to a service request, be sure to select the appropriate option so that the file access can be restricted as needed.

Logging

When reporting an issue about the add-in, generate a detailed log file that captures the steps that lead to the problem you want to report.

The log file that you generate captures information about steps during an Excel session.

1. In Excel, click the **Oracle Visual Builder** tab.
2. Select **Log Activity** from the Advanced menu to specify a directory location and file name for the log file. This starts the logging session.
3. Repeat the steps that lead to the issue.
4. Exit Excel completely to stop the logging session and before you access the log file.

 **Note:**

The next time you run Excel logging will no longer be enabled.

 **Caution:**

Log files may include personal information from the user's computer including, but not limited to, the computer's name and the end user's Windows profile name. Be sure to select the appropriate option when uploading files with personal information to a service request so that file access can be restricted as needed.

Log Console

The Log Console displays log messages based on the actions performed. If you encounter any issues, view the logging messages to troubleshoot and diagnose issues.

 **Note:**

If you are trying to provide a log file to support, refer to [Logging](#) to generate a log file, rather than trying to copy log entries from the Log Console.

To review logged messages in the Log Console:

1. In Excel, click the **Oracle Visual Builder** tab.
2. Select **Log Console**.
The Logging Console window displays.
3. Repeat the steps that led to the issue.
4. Review the logged messages.

5. Do one or more of the following as required:
 - Type a word or phrase in the **Filter** box to display matching log entries.
 - To display more details such as Time, Thread, and Level, click **Show Event Details**.
 - For verbose logging, click **Enable Verbose Output** and repeat the steps that led to the issue.
 - Click **Clear** to discard all log entries.

Diagnostic Report

The diagnostic report contains information that can help resolve issues. Provide a diagnostic report when reporting a problem with Oracle Visual Builder Add-in for Excel.

1. In Excel, click the **Oracle Visual Builder** tab.
2. Select **Diagnostic Report** from the Advanced menu.
3. Save the diagnostic report to a directory location with a file name of your choice.

Note:

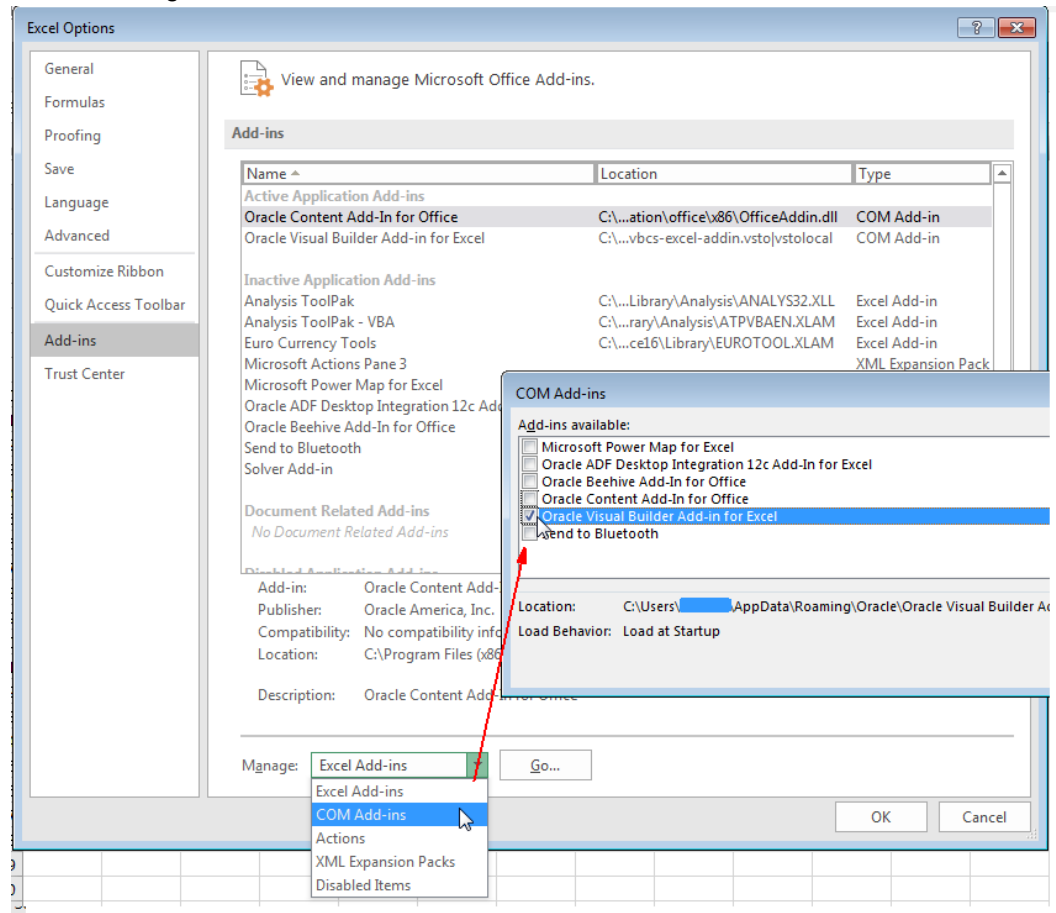
The report may include some personal information from the user's computer including, but not limited to, the computer's name and the end user's Windows profile name. Be sure to select the appropriate option when uploading files with personal information to a service request so that the file access can be restricted as needed.

Re-Enable Oracle Visual Builder Add-in for Excel

If your add-in becomes disabled and you are unable to use the [client health check tool](#), you can re-enable Oracle Visual Builder Add-in for Excel through Microsoft Excel.

1. In Excel, click **File > Options > Add-Ins**.
2. Select **COM Add-ins** in the Manage drop-down list and click **Go**.
3. Deselect the **Oracle Visual Builder Add-in for Excel** check box and click **OK**.
4. Restart Excel.
5. Enable the add-in by repeating the steps and instead selecting the **Oracle Visual Builder Add-in for Excel** check box from the **Add-ins available** list in the COM

Add-ins dialog.

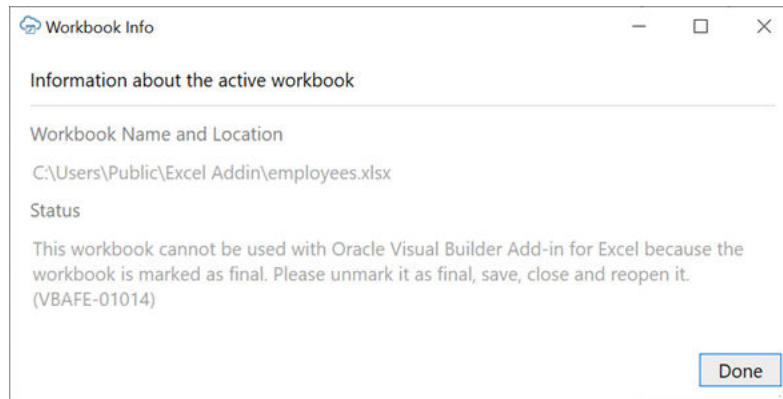


Resolve Workbook Issues

If you see an error message when you open a workbook or find that some **Oracle Visual Builder** ribbon commands are disabled, Oracle Visual Builder Add-in for Excel has detected an issue with your workbook. Use the Workbook Info window to troubleshoot these issues.

Your workbook may be unusable for a number of reasons such as if it is marked as final in Excel or has been saved to an incompatible file type.

To check the status of your workbook, open the Workbook Info viewer by choosing **Workbook Info** from the **Advanced** menu of the **Oracle Visual Builder** ribbon. This viewer shows information such as the name, location, and status of your workbook.



Check the status for the description of the issue and for any troubleshooting steps. Issue-free workbooks have a status of "Integrated". Workbooks that are not integrated with the add-in will show a status of "Not integrated".

In a scenario where a workbook is marked as "final", you'll need to clear the **Mark as Final** setting (under **File>Info>Protect Workbook**), then save and reopen the workbook.

 **Note:**

Do not use Excel's **Edit Anyway** button in the yellow message bar to try to edit the workbook. This command will not re-enable the **Oracle Visual Builder** ribbon.

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Migration

You can migrate an Excel workbook created or modified with version 2.x or 3.x of Oracle Visual Builder Add-in for Excel to use the current version of the add-in.

Workbooks created or modified with version 2.x or 3.x of the add-in migrate seamlessly to the latest version of the add-in. No special steps are required, other than the usual upgrade recommendations (see [Upgrade to the Latest Version](#)).

In general, your workbook should continue to function after the upgrade as before. If you want to take advantage of new add-in features, you may need to make some changes to the workbook configuration. However, once you configure your workbook to use the latest features, it may no longer be compatible with the older version of the add-in. So before distributing your updated workbook, make sure your target audience has access to the corresponding add-in version.

About Expressions

An expression is a string enclosed in curly braces (`{ }`) that can be evaluated to a single value at runtime. Expressions can reference configuration properties and dynamic runtime data.

For example, you might have a list of values for an employee `JobId` field that displays all job titles from the `jobId` field from the `Jobs` business object. To list only the job titles for a given department based on the `DepartmentId` of the current row, you could use a query parameter with the following expression:

```
DepartmentId={ this.BusinessObject.Fields['DepartmentId'].Value }
```

where:

- `this` represents the currently selected field;
- `BusinessObject` represents the business object to which this field belongs;
- `Fields['DepartmentId']` is the field (`DepartmentId`) associated with the business object; and
- `Value` is the value of the field.

You can also use `Parent` in an expression to refer to an ancestor business object ("parent" or higher) in a business object hierarchy. For example, to refer to a field in the parent business object you might use something like this:

```
ProjectNumber={ this.BusinessObject.Parent.Fields['ProjectNumber'].Value }
```

`Parent` can appear multiple times in the expression depending on the level you want to refer to in your business object hierarchy. For example, `ProjectNumber={ this.BusinessObject.Parent.Parent.Parent.Fields['ProjectNumber'].Value }` returns the value of the `ProjectNumber` field that belongs to the current business object's great grandparent business object.

You can also use an expression in the list of values for a row finder variable like this:

```
CountryId={ this.Finder.Variables['CountryId'].Value }
```

where:

- `Finder` is the row finder to which this finder variable belongs, and
- `Variables['CountryId']` is the finder variable (`CountryId`) whose value determines the available choices of the current finder variable.

The value of an operand or an intermediate result in an expression can be a Boolean value, string, or integer. However, the results of expressions may be converted to strings and concatenated if needed when resolving the entire property value.

For any given configuration property that supports expressions, you must escape any curly braces (`\{` or `\}`) that you wish to use literally.

 **Note:**

Some workbook configuration properties support expressions and others do not. Those properties that support expressions may support all reserved words or only a subset of them. Consult the documentation for each property to determine what is, and is not, supported.

Reserved Words




Refer to this table for some of the reserved words used in add-in expressions. Please note that this list is not exhaustive.

Reserved Word	Note
<code>this</code>	Represents the property owner depending on the configuration context. For example, when defining a field's configuration property, "this" represents the field. See specific configuration properties for details.
<code>BusinessObject</code>	Represents the business object to which the currently selected field belongs
<code>Finder</code>	Represents the row finder to which the currently selected variable belongs
<code>Parent</code>	Represents the parent business object of the currently selected field's business object in a business object hierarchy. Use additional instances in your expression to refer to higher level business objects, such as <code>Parent.Parent</code> for the grandparent business object and so on.
<code>Value</code>	Value of a parameter or a field
<code>SelectWindow</code>	Search-and-select window in a list of values
<code>Workbook</code>	Represents the integrated workbook

Literal Values

Literal values of these data types are supported in expressions:

- Boolean
- String
- Integer or floating-point number

Data Type	Description
Boolean	<p>Supported values (case-sensitive, no quotes):</p> <ul style="list-style-type: none"> • TRUE • True • true • FALSE • False • false
<div style="border-left: 2px solid #0070C0; border-right: 2px solid #0070C0; border-bottom: 2px solid #0070C0; padding: 10px;"> <p> Note:</p> <p>It's recommended that you use capital case only (TRUE and FALSE).</p> </div>	
String	<p>String literals inside expressions must be enclosed in single quotes ('). Single quotes inside string literals must be escaped (\ ').</p>
Integer or Floating-Point Number	<p>Only the Western Arabic numerals (0-9) can be used. Other digits are not supported.</p> <p>These symbols are supported:</p> <ul style="list-style-type: none"> • Leading negative sign (-) • Decimal separator (.) • Exponent (E or e followed by an optional sign and exponential digits)
<div style="border-left: 2px solid #0070C0; border-right: 2px solid #0070C0; border-bottom: 2px solid #0070C0; padding: 10px;"> <p> Note:</p> <p>This is allowed only when a decimal separator is present; for example, when the value is a floating-point number.</p> </div>	
<p>These symbols are not supported:</p> <ul style="list-style-type: none"> • Leading positive sign (+) 	
<div style="border-left: 2px solid #0070C0; border-right: 2px solid #0070C0; border-bottom: 2px solid #0070C0; padding: 10px;"> <p> Note:</p> <p>The plus sign when used as an operator is supported.</p> </div> <ul style="list-style-type: none"> • Thousand separator such as a space, period, comma, or underscore • No digit after the decimal separator 	

 **Note:**

Boolean and number literal values must be in the form described here. For example, if you are in a country that uses a decimal comma (,), you must still use a decimal point or period in your expression.

Here are some examples of how numbers are supported in expressions:

Supported	Not Supported
0.123	0,123 .123
123 123.0	123.
-456	+456 (part of literal value instead of doing addition)
1234	1,234 1 234
1234.567	1,234.567
3.14E2	03.14E2
1.0e10	1e10

 **Note:**

These rules only apply to literal values used in expressions. They do not apply to data formats used in an Excel cell. For example, you must write 135000 without thousand separator in this validation rule { this.Value > 135000 } but that validation rule can be used on an integer field that shows 150,000 or 150.000 in cell.

Operators

Operator precedence is high to low.

Operator	Note
[] .	Collection access, object member access
()	Grouping to change precedence
- !	Unary minus, negation
* /	Math (multiplicative)
+ -	Math (additive), also + for string concatenation
< > <= >=	Relational
== !=	Equality
&&	Logical AND
	Logical OR
? :	Ternary conditional

Examples

Here are some sample 'q'-type filter query parameters for use in list of values configurations:

Parameter Value	Use	Sample Value	Final Parameter Value
<code>DepartmentId={ this .BusinessObject.Fields['DepartmentId'].Value }</code>	This string sets the value of <code>DepartmentId</code> in the query to the current row item's department Id value.	Department Id is 101	DepartmentId=101
<code>DepartmentId={ this .BusinessObject.Parent.Parent.Fields['DepartmentId'].Value }</code>	This string sets the value of <code>DepartmentId</code> in the query to the department Id value in the current row item's "grandparent" layout.	Department Id is 101	DepartmentId=101
<code>FirstName LIKE '{ SelectWindow.SearchTerm }*' </code>	This string matches employees whose first name begins with the user-provided search term entered in the Search-and-Select window.	Search term is Steve	FirstName LIKE 'Steve*'
<code>CountryId={ this.Finder.Variables['CountryId'].Value }</code>	This string sets the value of <code>CountryId</code> in the query to the value of the current row finder's <code>CountryId</code> variable.	Country Id is USA	CountryId=USA
<code>DepartmentId={ this .BusinessObject.Fields['DepartmentId'].Value } { SelectWindow.SearchTerm == ' ? ' : 'AND FirstName LIKE \'' + SelectWindow.SearchTerm + '*\'' }</code>	This string includes two expressions. The second expression uses the ternary operator. It returns results based on whether there is a search term in the search box. If there is no search term, the parameter returns values matching the current row item's department Id value. If there is a search term, the parameter returns results that match the department Id <i>and</i> the search term. The quotes are all single quotation marks. Note also the enclosed empty strings and escaped single quotes.	Department id is 101 and there is no search term Department id is 101 and the search term is Steve	DepartmentId=101 AND FirstName LIKE 'Steve*'

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Embedded Browsers

Oracle Visual Builder Add-in for Excel uses either the WebView2 or the .NET WebBrowser control as an embedded web browser to display web pages from inside Microsoft Excel.

The embedded web browser is used to display the log-in web page when authenticating using Oracle Fusion Applications Token Relay or OAuth 2.0 Authorization Code Flow. See [Authentication Options](#).

WebView2 is based on Edge/Chromium. The .NET WebBrowser control is based on Microsoft Internet Explorer technology.

The add-in uses WebView2 if the appropriate runtime is detected on the local computer. Otherwise, it uses the .NET WebBrowser control. There is no option to choose the embedded web browser. Your default web browser setting in Windows Settings has no effect on the add-in.



Note:

If you wish to avoid using Internet Explorer with the add-in, make sure that the WebView2 runtime is installed as described in [The WebView2 Control](#).

The WebView2 Control

Microsoft Edge WebView2 is an embedded web browser based on Edge/Chromium. In order for Oracle Visual Builder Add-in for Excel to use WebView2, the WebView2 runtime must be installed on each computer where the add-in runs.

Installation

You can download the runtime from here: <https://developer.microsoft.com/en-us/microsoft-edge/webview2/consumer/>.



Note:

The WebView2 runtime may already be present on your computer if you have Microsoft 365 Apps installed. See [Microsoft Edge WebView2 and Microsoft 365 Apps](#).

Technical Notes

- Choose one of the "evergreen" installers. Do not choose the "Fixed Version" option.
- Using the WebView Refresh page function can interrupt the login sequence, particularly if it is performed early in the login sequence. Users should avoid using Refresh.

- If you encounter a problem with the log-in web page, please contact the page owner. Such pages are outside the scope of the add-in. Let the page owner know that the page needs to be compatible with Edge/Chromium. Refer to [Feature differences between Microsoft Edge and WebView2](#) on the Microsoft web site for more information.
- When the add-in uses the WebView2 browser control, the browser's SmartScreen feature is disabled. See the [Microsoft Defender SmartScreen Frequently Asked Questions](#) or the [documentation](#) for more information.
- The WebView2 browser control uses a user data folder on the local computer to store browser data, such as cookies, permissions, and cached resources. This folder can be found under `%LocalAppData%\Oracle\Visual Builder\`. For example, `C:\Users\username\AppData\Local\Oracle\Visual Builder\EBWebView`.
To clear the browser cache for the WebView2 browser control, refer to [Clear the Embedded Browser Cache](#).
See also [Manage the User Data Folder](#) in the Microsoft Edge documentation.
- When the add-in uses the WebView2 browser control, it enables some Microsoft capabilities relating to single sign-on (SSO) with Azure Active Directory, such as the `AllowSingleSignOnUsingOSPrimaryAccount` property. See the [AllowSingleSignOnUsingOSPrimaryAccount](#) property in the *Microsoft API Reference*.

The .NET WebBrowser Control

If Oracle Visual Builder Add-in for Excel cannot find a compatible WebView2 runtime, it uses the .NET WebBrowser control instead. The .NET WebBrowser control is based on Microsoft Internet Explorer technology.

Support Notes

- Microsoft ended support for Internet Explorer (IE) 11 desktop application for certain operating systems on June 15, 2022. Refer to *Lifecycle FAQ - Internet Explorer and Microsoft Edge* at <https://docs.microsoft.com/en-us/lifecycle/faq/internet-explorer-microsoft-edge>.
- Oracle support for the .NET WebBrowser Control is deprecated and will be dropped in a future release. You should install the WebView2 runtime as soon as possible.

Installation

There is no special installation required. This control is part of the Microsoft .NET Framework.

Since the .NET WebBrowser control is based on Microsoft Internet Explorer, make sure that Internet Explorer has been upgraded to version 11 and that all Microsoft updates and security patches have been applied.

Technical Notes

- If you encounter a problem with the log-in web page, please contact the page owner. Such pages are outside the scope of the add-in. Let the page owner know that the page needs to be compatible with Microsoft Internet Explorer (IE).

- When troubleshooting a problem, be sure to pay special attention to your IE configuration. There are key settings under Internet Options that can influence the behavior of the add-in. These settings include the LAN settings, Security settings, Languages settings, and Certificates settings.
- The add-in installer sets the `FEATURE_BROWSER_EMULATION` feature control key for Excel in the registry to IE 11 mode. See [Browser Emulation](#) in the Microsoft Internet Explorer documentation.

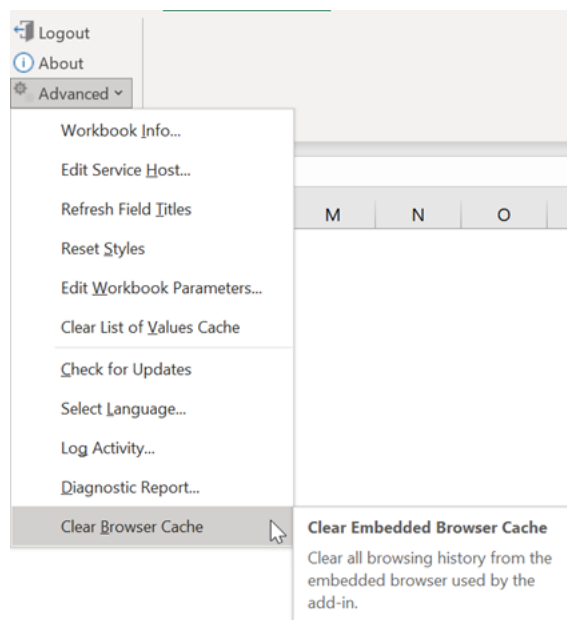
Clear the Embedded Browser Cache

If required, you can clear the cache for the embedded browser to get rid of all browser data including profile data such as history, bookmarks, and cookies. You may want to try clearing the browser cache if, for example, you are having an issue with a login page.

Oracle Visual Builder Add-in for Excel uses the WebView2 control as an embedded browser if it detects a compatible version of the WebView2 runtime. Otherwise, it uses the .NET WebBrowser control, which is based on Microsoft Internet Explorer (IE).

Clear the WebView2 browser cache by following the instructions in this topic. Clear the .Net WebBrowser browser cache from your Windows Internet Options dialog. Check your Windows help for details.

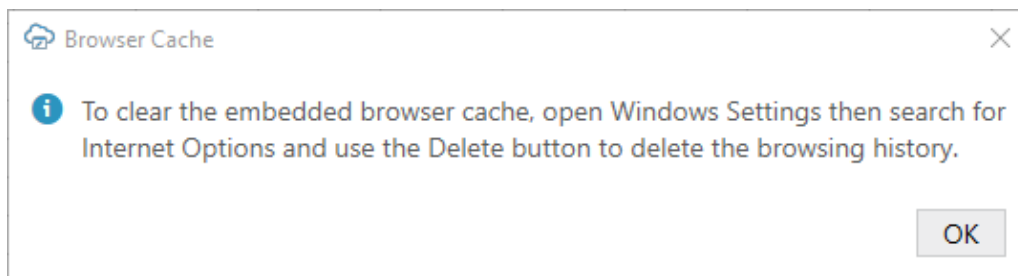
To clear the cache for the embedded browser, choose **Clear Embedded Browser Cache** from the **Advanced** menu.



Note:

You can also clear this cache by simply deleting the `EBWebView` folder at `%localappdata%\Oracle\Visual Builder\EBWebView`. The browser recreates the folder when the add-in next accesses the browser.

If the add-in uses the WebView2 control as the embedded browser, the cache is cleared. If it uses the .NET WebBrowser control instead, you'll see this message:



Close this message and clear the browser cache as directed.

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Microsoft.OpenApi, Version 1.3.1

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Microsoft.Web.WebView2, Version: 1.0.1343.22

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NewtonSoft.Json, Version 13.0.1

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SharpYaml, Version 1.9.0

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=====
 ===

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=====

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