

Publishing WFS Services Tutorial



Table of Contents

Tutorial: Publishing a WFS service	3
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Tutorial: Publishing a WFS service

Complexity: Beginner Data Requirement: Use your own data

This tutorial will show you how to publish a WFS service with read-only access using ArcGIS Server Manager. When a map service or geodata service is published with WFS capabilities, the data can be accessed by OGC-compliant WFS clients, including the Data Interoperability extension in ArcCatalog and ArcMap. These WFS clients can also see the latest changes made to the data. If you're new to WFS services and want to learn more about it before attempting this tutorial, see [WFS services](#).

If you've just installed ArcGIS Server, you need to complete some preparatory steps before you can log in to Manager or publish services. You can find these steps in the [Getting started after install](#) section of this help system.

Setup requirements for publishing a service

To create a map service or geodata service, you need to place the map document (.mxd), geodatabase (File or Personal) or SDE connection file in a shared location visible to all server object container (SOC) machines in your GIS server. The SOC Account you created during the postinstallation must also have permissions to read the map document and all the data it references (map service), or all the data in the geodatabase that you wish to publish (geodata service).

Deciding between a geodata service or a map service

With WFS services, you have the option of publishing a geodata service or a map service. There are a few differences to be aware of when selecting the type of service you are going to create. The following sections summarize the functionality available with geodata and map services to help you identify which type of service best suits your requirements.

Geodata services

A WFS geodata service allows you to access a geodatabase through the Internet or any OGC-compliant WFS client. A geodata service may be created for any type of geodatabase including ArcSDE geodatabases, personal geodatabases, and file geodatabases. When creating a WFS service from a geodata service, it is important to keep in mind that all the feature classes in the geodatabase will be exposed in the service.

Geodata services are useful in situations where you need to access geodatabases in remote locations. For example, a company may want to set up ArcSDE geodatabases to manage data in its Los Angeles and New York offices. Once created, each office can publish its ArcSDE geodatabase on the Internet using a geodata service.

Map services

A WFS map service represents a map document (.mxd) that you've made available to others through the internet or any OGC-compliant WFS client. Map services with WFS functionality give you a lot of control over the data that is published through the service. Here are some common reasons why you might set up a map service:

- Unlike a geodata service, a single map service may include data from a variety of sources including data from multiple geodatabases (personal, file and ArcSDE) as well as shapefiles.
- You can select which feature classes are exposed through a map service.

- You can rename the feature classes in the map document so that the service does not expose the actual names in the data source.

There are also some limitations associated with WFS map services. Consider the following things when publishing a WFS service from a map document:

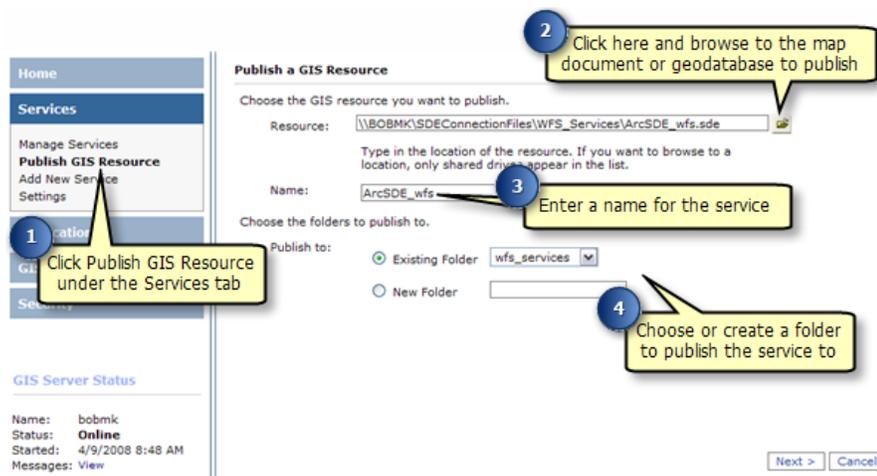
- The map document is just a specification of the layers that will be available in your WFS service. Symbology, query definitions, and field aliases defined at the layer level will not transfer to the WFS service because the purpose of the service is to expose the features in the data. To expose the visual properties of your map through OGC specifications, use a WMS service.
- Two or more layers in the map cannot reference the same feature class.
- Two or more layers in the map cannot have the same name.
- Since WFS only works with features, any raster layers in the map will be excluded from the service.
- Nonspatial tables are not exposed.
- If you want the WFS service to support transactions for editing (WFS-T), the source data for all the layers in the map must come from the same workspace, for example, the same ArcSDE geodatabase.

Publishing a WFS service

Follow these steps to create your geodata or map service:

Steps:

Start ArcGIS Server Manager and log in. For additional help with this step, see [Logging in to Manager](#).



1. In the **Services** tab, click **Publish a GIS Resource**.
2. To select the **Resource**, use the drop-down box to browse to the map document (.mxd) or geodatabase (personal, file, or SDE connection file [.sde]) that you want to publish.

3. In the **Name** box, type a name for the service. The name cannot be more than 120 characters long and may contain only alphanumeric characters and underscores.
4. There are three options for the folder to publish the service to:
 - Use the drop-down menu to choose an existing folder.
 - Create a new folder.
 - Accept the default folder; this will publish to the root folder.

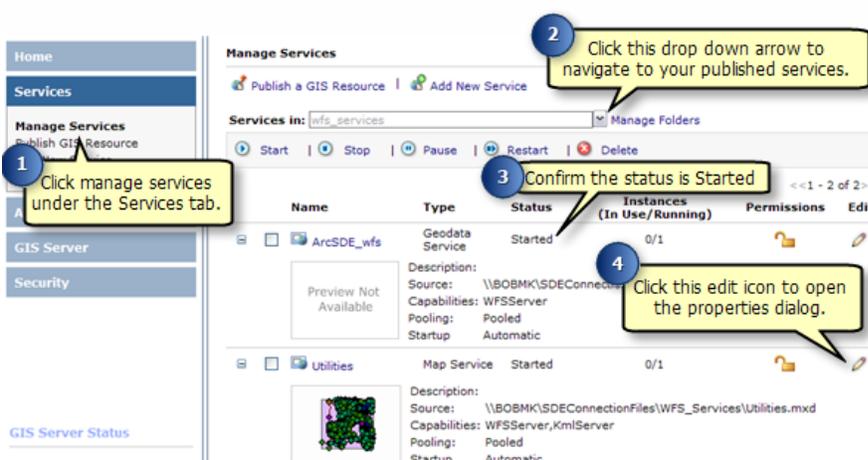
After choosing where to publish the service, click Next to continue.

5. Select **WFS** to enable the capability for the service and click **Next**.
6. Review the information about the service you are about to create. Then click **Finish** to create the service.

If you have an existing service that does not have WFS capabilities enabled, follow these steps to enable it:

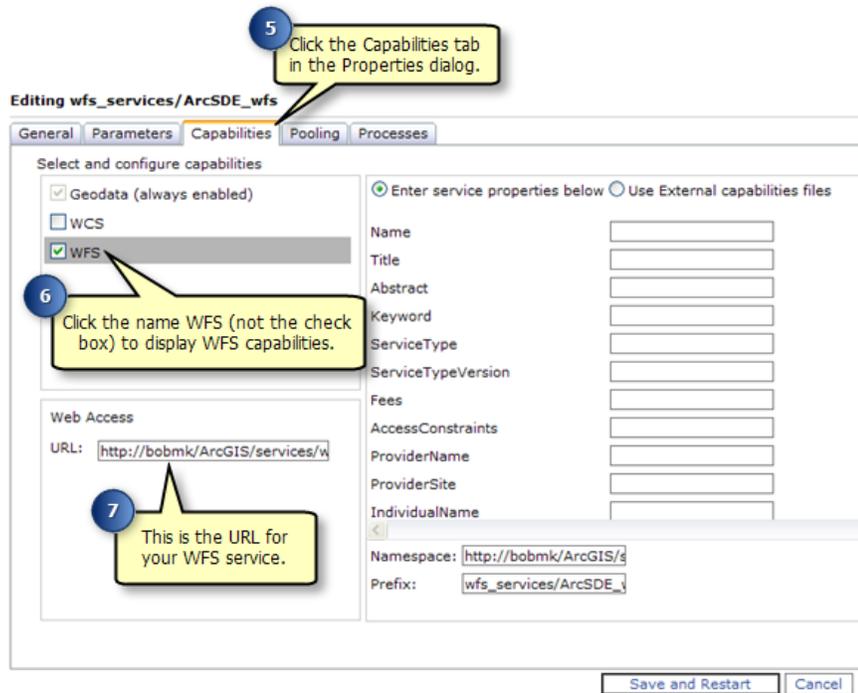
1. Your service may be listed with its **Status** as **Started**. To change settings on your service, the service must be stopped. If the status is shown as **Started**, click the check box beside your service and click the **Stop** button.
2. Click the **Edit** option for the service. This will allow you to edit the properties of the service including the capabilities.
3. Click the **Capabilities** folder.
4. Click the **WFS** check box.
5. Click **OK** to enable the capability.

How to acquire the URL for your WFS service



Steps:

1. Under the **Services** tab in ArcGIS Server Manager, click **Manage Services**.
2. Click the **Services in** drop-down arrow and navigate to the service folder containing your published service.
3. Your service should be listed with its **Status** as **Started**. If the status is shown as **Stopped**, check the check box beside your service and click the **Start** button.
4. To acquire the URL for your WFS service, click the edit icon to open the properties dialog box.



5. In the properties dialog box, select the **Capabilities** tab.
6. Highlight the **WFS** option under the **Select and configure capabilities** window. This will display the WFS service properties.
7. The URL for your WFS service is located in the **Web Access** window. This is the URL that you and other users will use to connect to the WFS service you have published.

Working with published data using a WFS client

Once you have published a WFS service, it can be used in any client that supports WFS 1.1 and the Simple Features profile of GML including Web browsers. You can also use the Data Interoperability extension in ArcCatalog and ArcMap to work with WFS services. The following sections will show you how to access WFS services through a Web browser and the Data Interoperability extension in ArcCatalog.

Connecting to your WFS service through a Web browser

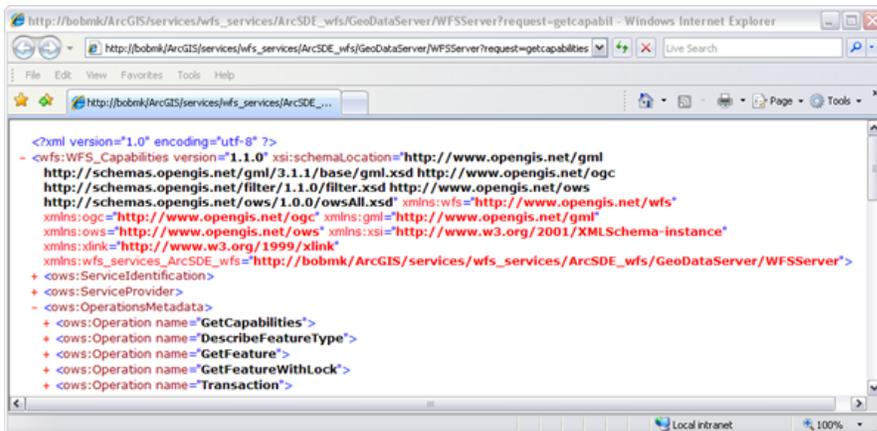
A Web browser is one of the simplest clients of a WFS service. You can request information through HTTP, and the responses or exceptions are returned through the browser.

To connect to your service, you need to know the WFS URL, which can be located in the service's Properties under the Capabilities tab in ArcGIS Server Manager or ArcCatalog. Once you have the URL, you can use OGC standard operations to request information about the service through HTTP. Some examples of operations that you can use to request information include the following:

GetCapabilities

This request will return all feature types and functionality available through the service in GML format. To use the GetCapabilities operation in a Web browser, copy and paste the WFS URL into the address bar and add ?request=getCapabilities to the end, as shown in the example and screen shot below.

URL example: http://bobmk/arcgis/services/wfs_services/ArcSDE_wfs/GeoDataServer/WFSServer?request=getcapabilities



The following graphic is an example of functionality returned by the GetCapabilities operation:

```

- <ows:OperationsMetadata>
+ <ows:Operation name="GetCapabilities">
+ <ows:Operation name="DescribeFeatureType">
+ <ows:Operation name="GetFeature">
+ <ows:Operation name="GetFeatureWithLock">
+ <ows:Operation name="Transaction">
- <ows:ExtendedCapabilities>
  - <ows:Constraint name="serviceAxisOrderForSwappableSRS">
    <ows:Value>latitude,longitude</ows:Value>
  </ows:Constraint>
</ows:ExtendedCapabilities>
</ows:OperationsMetadata>
    
```

List of functionality available through the WFS service

Includes the axis order so that you know what axis order to expect in the responses

GetCapabilities also returns a list of all available feature classes and tables:

```

- <wfs:FeatureTypeList>
- <wfs:FeatureType>
  <wfs:Name>wfs_services_ArcSDE_wfs:province</wfs:Name>
  <wfs>Title>province</wfs>Title>
  <wfs:DefaultSRS>urn:x-ogc:def:crs:EPSG:6.9:4326</wfs:DefaultSRS>
  <wfs:OtherSRS>urn:x-ogc:def:crs:EPSG:6.9:4326</wfs:OtherSRS>
- <wfs:OutputFormats>
  <wfs:Format>text/xml; subType=gml/3.1.1/profiles/gmlsf/1.0.0/0</wfs:Format>
</wfs:OutputFormats>
- <ows:WGS84BoundingBox>
  <ows:LowerCorner>-141.003005981 41.913318634</ows:LowerCorner>
  <ows:UpperCorner>-52.620281219 83.108322144</ows:UpperCorner>
</ows:WGS84BoundingBox>
</wfs:FeatureType>
- <wfs:FeatureType>
  <wfs:Name>wfs_services_ArcSDE_wfs:cities</wfs:Name>
  <wfs>Title>cities</wfs>Title>
  <wfs:DefaultSRS>urn:x-ogc:def:crs:EPSG:6.9:4326</wfs:DefaultSRS>
  <wfs:OtherSRS>urn:x-ogc:def:crs:EPSG:6.9:4326</wfs:OtherSRS>
- <wfs:OutputFormats>
  <wfs:Format>text/xml; subType=gml/3.1.1/profiles/gmlsf/1.0.0/0</wfs:Format>
</wfs:OutputFormats>
- <ows:WGS84BoundingBox>
  <ows:LowerCorner>-135.159896851 43.72077179</ows:LowerCorner>
  <ows:UpperCorner>-52.684871674 68.269996643</ows:UpperCorner>
</ows:WGS84BoundingBox>
</wfs:FeatureType>
</wfs:FeatureTypeList>

```

Feature class called Province

The spatial referencing system (SRS) and output format of the feature class are listed in the GetCapabilities results

It also includes the bounding coordinates of the feature class

A feature class called Cities and all of its properties

DescribeFeatureType

This request describes the field information about one or more features in the WFS service. This includes the field names, field types, allowed minimum and maximum field values, and any other constraints set on a field of the feature classes or tables.

To use the DescribeFeatureType operation in a Web browser, copy and paste the WFS URL into the address bar and add

?SERVICE=WFS&VERSION=1.1.0&REQUEST=DescribeFeatureType&VERSION=1.1.0 to the end of the URL. This will return all the field information about each of the feature types and tables available in the feature service, as seen in the screen shot below.

URL Example: http://bobmk/arcgis/services/wfs_services/ArcSDE_wfs/GeoDataServer/WFSServer?SERVICE=WFS&VERSION=1.1.0&REQUEST=DescribeFeatureType&VERSION=1.1.0

```
<xs:element name="province" type="wfs_services_ArcSDE_wfs:provinceType"
  substitutionGroup="gml:_Feature" />
<xs:complexType name="provinceType">
- <xs:complexContent>
- <xs:extension base="gml:AbstractFeatureType">
- <xs:sequence>
  <xs:element name="OBJECTID" type="xs:int" />
- <xs:element name="NAME" minOccurs="0">
- <xs:simpleType>
- <xs:restriction base="xs:string">
  <xs:maxLength value="25" />
  </xs:restriction>
  </xs:simpleType>
  </xs:element>
  <xs:element name="POP91_SQMI" minOccurs="0" type="xs:double" />
  <xs:element name="SHAPE" minOccurs="0" type="gml:MultiSurfacePropertyType" />
  <xs:element name="SHAPE.AREA" type="xs:double" />
  <xs:element name="SHAPE.LEN" type="xs:double" />
  </xs:sequence>
  </xs:extension>
</xs:complexContent>
</xs:complexType>
```

The DescribeFeatureType request returned all of the feature classes and tables available in the service including Province.

It also returned information about the field names, field types and any constraints set on the fields for each feature class or table.

Adding filters

You can also specify a single feature class or table that you want the field information for by appending the following request to the end of the URL with the name of the feature type or table:

?SERVICE=WFS&VERSION=1.1.0&REQUEST=DescribeFeatureType&TypeName=[enter feature type here]&VERSION=1.1.0

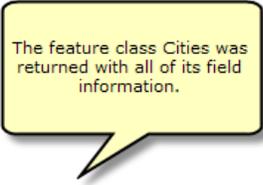
In the example below, the DescribeFeatureType request is used to identify the field information for the feature type called cities.

URL example: http://bobmk/arcgis/services/wfs_services/ArcSDE_wfs/GeoDataServer/WFSServer?SERVICE=WFS&VERSION=1.1.0&REQUEST=DescribeFeatureType&TypeName=cities&VERSION=1.1.0

```

<xs:element name="cities" type="wfs_services_ArcSDE_wfs:citiesType"
  substitutionGroup="gml:Feature" />
<xs:complexType name="citiesType">
- <xs:complexContent>
- <xs:extension base="gml:AbstractFeatureType">
- <xs:sequence>
  <xs:element name="OBJECTID" type="xs:int" />
- <xs:element name="NAME" minOccurs="0">
- <xs:simpleType>
  - <xs:restriction base="xs:string">
    <xs:maxLength value="51" />
  </xs:restriction>
  </xs:simpleType>
</xs:element>
- <xs:element name="CAPITAL" minOccurs="0">
- <xs:simpleType>
  - <xs:restriction base="xs:string">
    <xs:maxLength value="1" />
  </xs:restriction>
  </xs:simpleType>
</xs:element>
- <xs:element name="PROV_NAME" minOccurs="0">
- <xs:simpleType>
  - <xs:restriction base="xs:string">
    <xs:maxLength value="25" />
  </xs:restriction>
  </xs:simpleType>
</xs:element>
<xs:element name="POPULATION" minOccurs="0" type="xs:double" />
<xs:element name="SHAPE" minOccurs="0" type="gml:PointPropertyType" />

```



The feature class Cities was returned with all of its field information.

GetFeature

This request returns information about specific feature types available through the WFS service. Additionally, filters can be used to refine the information that is returned. For more information about the different filters available with WFS services, see WFS Services.

To use the GetFeature operation in a Web browser, copy and paste the WFS URL into the address bar and add `?request=getFeature&typename=[enter feature type here]` to the end of the URL. This will return all the attribute and geometry information about each feature or row in the feature type.

URL example: `http://bobmk/arcgis/services/wfs_services/ArcSDE_wfs/GeoDataServer/WFSServer?request=getfeature&typename=cities`

```

<gml:featureMember>
- <wfs_services_ArcSDE_wfs:cities gml:id="F293__1">
  <wfs_services_ArcSDE_wfs:OBJECTID>1</wfs_services_ArcSDE_wfs:OBJECTID>
  <wfs_services_ArcSDE_wfs:NAME>Vancouver</wfs_services_ArcSDE_wfs:NAME>
  <wfs_services_ArcSDE_wfs:CAPITAL>N</wfs_services_ArcSDE_wfs:CAPITAL>
  <wfs_services_ArcSDE_wfs:PROV_NAME>British Columbia</wfs_services_ArcSDE_wfs:PROV_NAME>
  <wfs_services_ArcSDE_wfs:POPULATION>1380729</wfs_services_ArcSDE_wfs:POPULATION>
- <wfs_services_ArcSDE_wfs:SHAPE>
- <gml:Point>
  <gml:pos>49.159999847 -123.069999695</gml:pos>
  </gml:Point>
  </wfs_services_ArcSDE_wfs:SHAPE>
</wfs_services_ArcSDE_wfs:cities>
</gml:featureMember>

```

All of the features in the Cities feature class are listed

It also lists all of the field names and the attributes for each feature

Adding filters

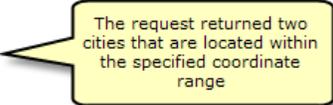
You can also add filters in the request to refine the results that are returned. For example, you can request all the cities that are within a specified coordinate range. In the example below, two cities are located within a specified coordinate range.

URL Example: `http://bobmk/arcgis/services/wfs_services/ArcSDE_wfs/GeoDataServer/WFSServer?request=getfeature&typename=cities&BBOX=46.90,-76.21,42.12,-72.88`

```

<gml:featureMember>
- <wfs_services_ArcSDE_wfs:cities gml:id="F293__6">
  <wfs_services_ArcSDE_wfs:OBJECTID>6</wfs_services_ArcSDE_wfs:OBJECTID>
  <wfs_services_ArcSDE_wfs:NAME>Ottawa</wfs_services_ArcSDE_wfs:NAME>
  <wfs_services_ArcSDE_wfs:CAPITAL>C</wfs_services_ArcSDE_wfs:CAPITAL>
  <wfs_services_ArcSDE_wfs:PROV_NAME>Ontario</wfs_services_ArcSDE_wfs:PROV_NAME>
  <wfs_services_ArcSDE_wfs:POPULATION>819263</wfs_services_ArcSDE_wfs:POPULATION>
- <wfs_services_ArcSDE_wfs:SHAPE>
  - <gml:Point>
    <gml:pos>45.374221802 -75.650749207</gml:pos>
    </gml:Point>
  </wfs_services_ArcSDE_wfs:SHAPE>
</wfs_services_ArcSDE_wfs:cities>
</gml:featureMember>
<gml:featureMember>
- <wfs_services_ArcSDE_wfs:cities gml:id="F293__7">
  <wfs_services_ArcSDE_wfs:OBJECTID>7</wfs_services_ArcSDE_wfs:OBJECTID>
  <wfs_services_ArcSDE_wfs:NAME>Montreal</wfs_services_ArcSDE_wfs:NAME>
  <wfs_services_ArcSDE_wfs:CAPITAL>N</wfs_services_ArcSDE_wfs:CAPITAL>
  <wfs_services_ArcSDE_wfs:PROV_NAME>Quebec</wfs_services_ArcSDE_wfs:PROV_NAME>
  <wfs_services_ArcSDE_wfs:POPULATION>2921357</wfs_services_ArcSDE_wfs:POPULATION>
- <wfs_services_ArcSDE_wfs:SHAPE>
  - <gml:Point>
    <gml:pos>45.54101944 -73.653526306</gml:pos>
    </gml:Point>
  </wfs_services_ArcSDE_wfs:SHAPE>
</wfs_services_ArcSDE_wfs:cities>
</gml:featureMember>

```



The request returned two cities that are located within the specified coordinate range

Using the Data Interoperability extension to connect to a WFS service

The Data Interoperability extension allows you to read and write data in data formats besides ArcGIS. You can use the Interoperability Connection tool located in ArcCatalog to connect directly to external ESRI data formats, including WFS services. Once the connection is made, the data source will appear underneath the **Interoperability Connection** entry in the Catalog Tree. A connection is just like any other dataset in that you can add it to ArcMap or use it in geoprocessing tools. For more information about how to connect to a WFS service using the Data Interoperability Extension, see [How to work with WFS using ArcGIS Desktop](#).