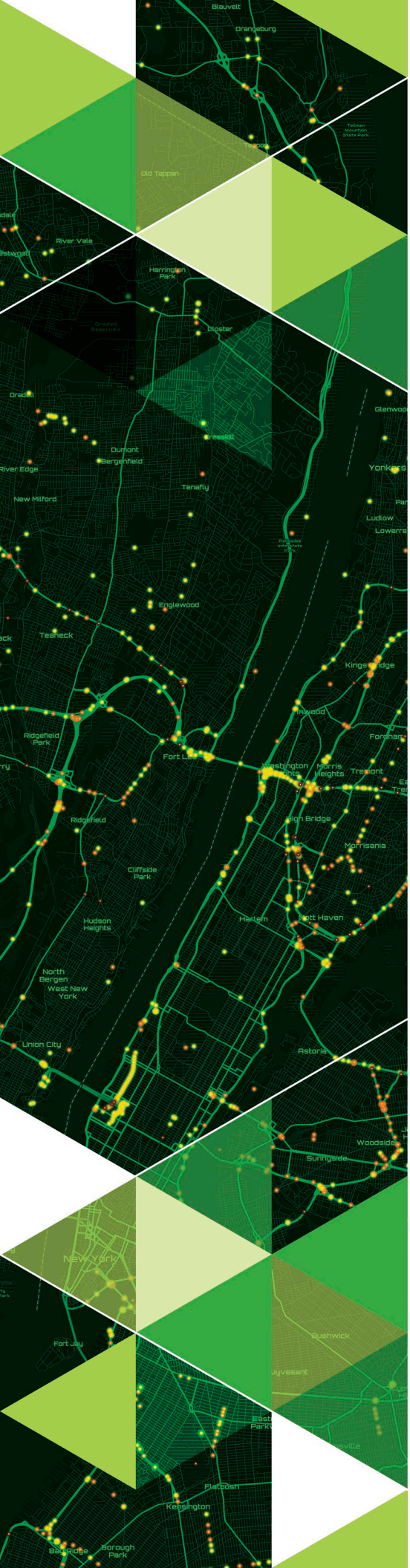


AN ESRI
TECHNICAL PAPER

May 2021

Manually migrating services from the ArcMap-based to the ArcGIS Pro-based runtime

380 New York Street
Redlands, California 92373-8100 USA
909 793 2853
info@esri.com
esri.com

esri® | THE SCIENCE OF WHERE®

Copyright © 2021 Esri
All rights reserved.
Printed in the United States of America.

The information contained in this document is the exclusive property of Esri. This work is protected under United States copyright law and other international copyright treaties and conventions. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, except as expressly permitted in writing by Esri. All requests should be sent to Attention: Contracts and Legal Services Manager, Esri, 380 New York Street, Redlands, CA 92373-8100 USA.

The information contained in this document is subject to change without notice.

Esri, the Esri globe logo, The Science of Where, ArcGIS, esri.com, and @esri.com are trademarks, service marks, or registered marks of Esri in the United States, the European Community, or certain other jurisdictions. Other companies and products or services mentioned herein may be trademarks, service marks, or registered marks of their respective mark owners.

Table of Contents

Summary 4

Introduction 5

Manually migrating ArcMap-based services 5

Map services 6

Feature services 9

Geocode services 13

Geodata services 15

Geoprocessing services 16

Image services 19

KML services 23

Network analysis services 24

OGC services 25

Scene services 25

Schematics services 25

Stream services 25

Utility network services 25

Vector tile services 25

Services with SOEs and SOIs 26

Conclusion 26

Manually migrating services from the ArcMap-based to the ArcGIS Pro-based runtime

Summary

ArcGIS Enterprise's ArcGIS Server component currently includes two internal runtimes: one runtime for services published from ArcMap and a second runtime for services published from ArcGIS Pro. Starting with the ArcGIS 2022 releases, the ArcMap-based runtime will be removed from the software, meaning it will no longer be possible to publish or use ArcMap-based services in ArcGIS Server sites.

The ArcGIS 2021 releases, which include ArcGIS Enterprise 10.9.x, includes specific migration tooling to help migrate compatible services from the ArcMap-based to the ArcGIS Pro-based runtime. Even with the migration tooling introduced in the software, some services will need to be manually migrated – meaning they will need to be republished from ArcGIS Pro. The steps necessary to manually migrate the runtime of your ArcMap-based services will be the focus of this technical paper.

While ArcGIS Enterprise 10.9.x and earlier still include both the ArcMap-based and ArcGIS Pro-based runtimes, it is never too early to start planning and preparing for a release of ArcGIS Enterprise, or ArcGIS Server, with only the ArcGIS Pro-based runtime.

Introduction

ArcGIS Enterprise's ArcGIS Server component currently includes two internal runtimes: one runtime for services published from ArcMap and a second runtime for services published from ArcGIS Pro. The ArcMap-based runtime components will be removed ArcGIS Enterprise following the 2020 announcement regarding ArcGIS Desktop continued support.

Starting with the ArcGIS 2022 releases, the ArcMap-based runtime will be removed from the software. This means with releases of ArcGIS Enterprise from 2022 onwards, it will no longer be possible to publish or consume services from ArcMap and ArcMap-based ArcPy to ArcGIS Server sites (both federated and non-federated). Most existing services previously published from ArcMap will continue to work unchanged after an automated migration process. However, some services originally published from ArcMap will not be compatible with the ArcGIS Pro-based runtime and will need to be manually migrated by re-authoring the service using ArcGIS Pro and republishing it.

The ArcGIS 2021 releases, starting with ArcGIS Enterprise 10.9, includes specific migration tooling. This tooling will allow for you to make sure all compatible services are migrated to the latest runtime before ultimately upgrading to an ArcGIS 2022 release, or later, that contains only the ArcGIS Pro-based runtime. For more information on the migration tooling introduced at 10.9, see the migrating services to the ArcGIS Pro service runtime section of the ArcGIS Enterprise documentation and the Migrating services to the ArcGIS-Pro based runtime in ArcGIS Enterprise 10.9 blog.

Non-compatible services will need to be manually migrated from the ArcMap-based runtime to the ArcGIS Pro-based runtime. For those at ArcGIS Enterprise 10.8.1 or earlier that are preparing to migrate from the ArcMap-based runtime to the ArcGIS Pro-based runtime, all services will need to be migrated manually. This technical paper will provide an inventory of all ArcGIS Server service types, steps for locating the source data of the service in order help in the republishing your services, and links to documentation for publishing new services from ArcGIS Pro.

Hosted content leveraging ArcGIS Data Store will not be affected by these changes.

Manually migrating ArcMap-based services

In order to manually migrate your ArcMap-based services, the service will need to be published as a new service from ArcGIS Pro. Take this opportunity to decide if you want the service to have the exact same name or a new name. If using the exact same name, the ArcMap-based service can be republished by overwriting the original service through ArcGIS Pro. If overwriting the original service, any references to the original service (i.e., within web maps or web applications) will now reference the new service.

When going through these workflows, be aware of any potential downtime between when the original service has been deleted and the new service has yet to be published.

Map services

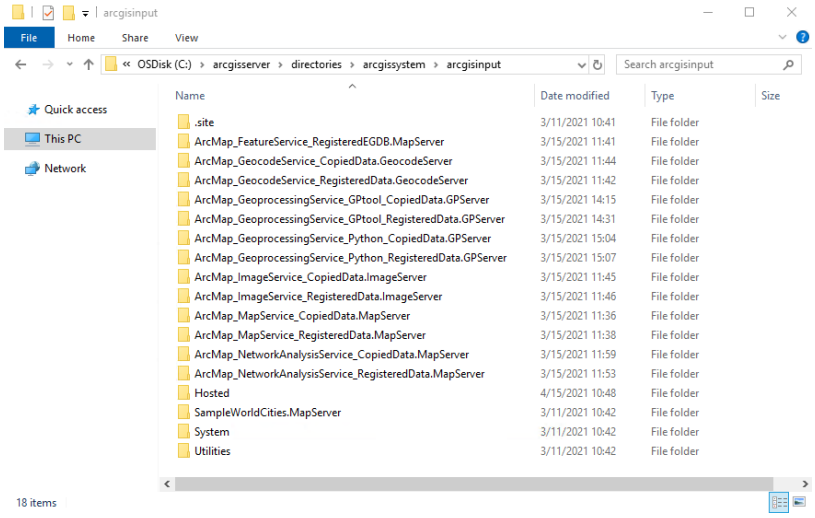
In order to manually republish a map service, the original source data will need to be added to a project in ArcGIS Pro and then published to ArcGIS Enterprise or ArcGIS Server. It can either be published as a new service or overwritten over the original ArcMap-based service.

Accessing the source data

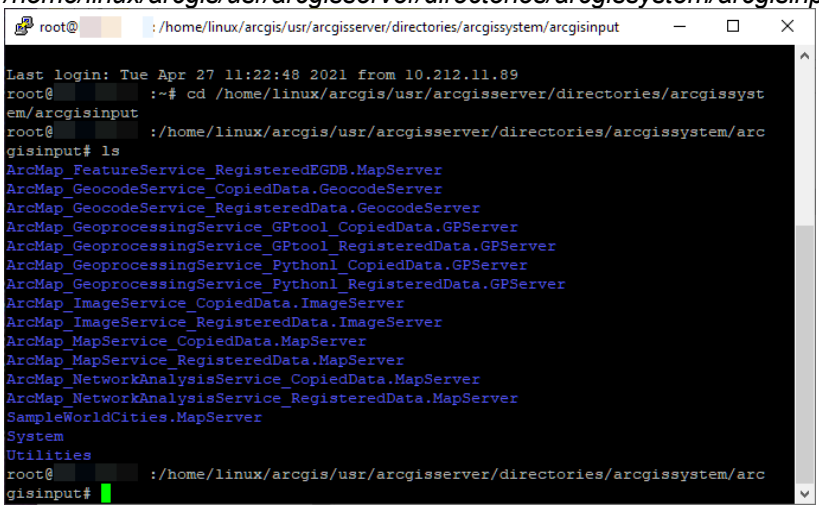
If you don't have the original map document or data the ArcMap-based service was published from, the following steps can be used to obtain it from ArcGIS Server. To access the source data of a map service, it is necessary to have access to the machine where ArcGIS Server is installed.

1. Sign onto the machine where ArcGIS Server is installed.
2. Navigate to **arcgisinput** folder. This folder contains source information for all the services published to ArcGIS Server.

In Windows, the default folder path is:
C:\arcgisserver\directories\arcgissystem\arcgisinput



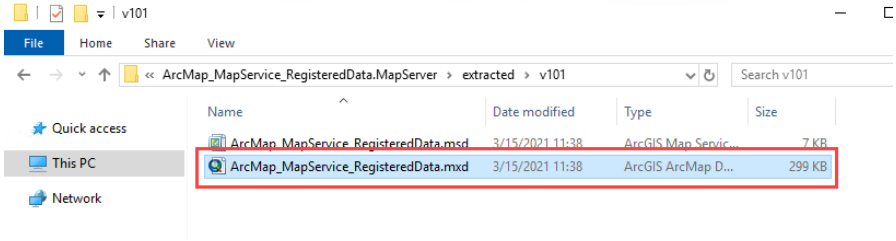
In Linux, the default folder path is:
/home/linux/arcgis/usr/arcgisserver/directories/arcgissystem/arcgisinput



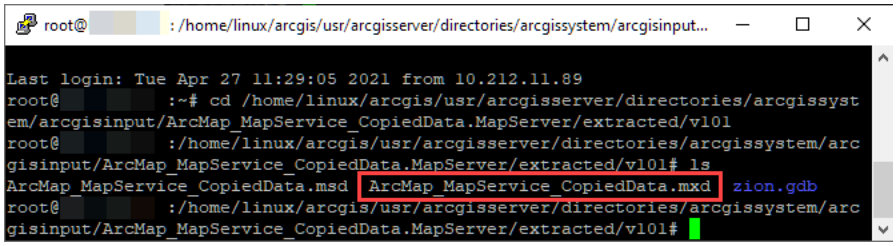
3. Open the folder for the map service being migrated.

   If the service was published to a folder, instead of the root directory, navigate to this folder first.
4. Open the **extracted** folder.
5. Open the **v101** folder.
6. This folder contains a .msd and a .mxd. This workflow will be using the .mxd.

In Windows



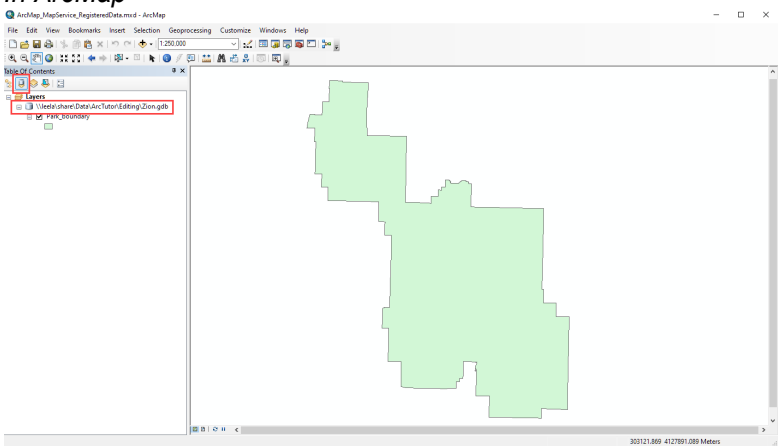
In Linux



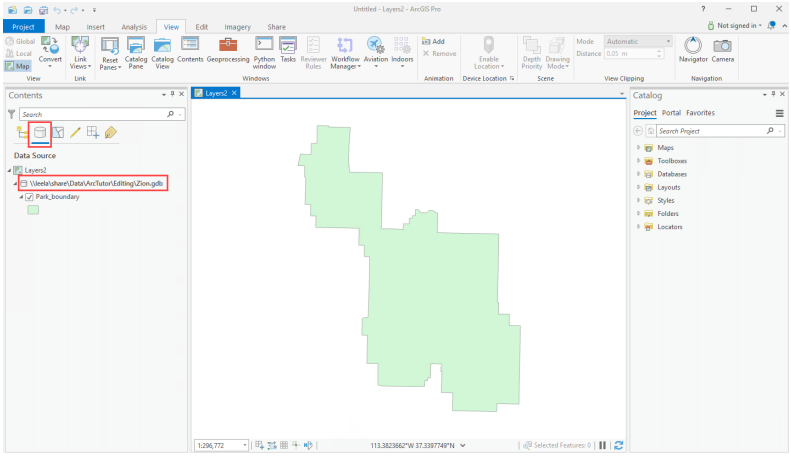
7. Open the .mxd in either ArcMap or ArcGIS Pro.

   If the machine that is hosting ArcGIS Server also has ArcMap or ArcGIS Pro installed, the .mxd can be opened directly on this machine. If the machine that that is hosting ArcGIS Server doesn't have ArcMap or ArcGIS Pro installed, the .mxd will need to be copied to a location accessible by either ArcMap or ArcGIS Pro.
8. Once the .mxd is open, look at the source data. Write down the source information for later reference.

In ArcMap



In ArcGIS Pro



9. Now that the data source for the ArcMap-based service has been recorded, a new map service can be published or overwritten from ArcGIS Pro.

Before publishing a new map service

Before publishing a new map service from ArcGIS Pro, check to see if the original data source is still supported. IBM Informix, IBM Db2 for z/OS, and raster catalogs are supported as data sources for ArcMap-based services but are not supported as data sources for ArcGIS Pro-based services. They will therefore need to be migrated to a supported data source before publishing a new map service from ArcGIS Pro. If your organization has a requirement for using Informix or Db2 for z/OS, contact your account manager or international distributor to review database options for ArcGIS Pro-based services. If using a raster catalog, see the Migrate a raster catalog to a mosaic dataset section of the documentation for more information on this.

Publishing a new map service

The steps to publish a new map service will vary if publishing a new service or overwriting an existing service and if publishing to ArcGIS Enterprise or a standalone ArcGIS Server.

If publishing a new service to ArcGIS Enterprise

See the Share a map image layer section of the ArcGIS Pro documentation.

If overwriting an existing service in ArcGIS Enterprise

See the Overwrite a map image layer section of the ArcGIS Pro documentation.

If publishing to a standalone ArcGIS Server

See the Publish a map service section of the ArcGIS Pro documentation.

Feature services

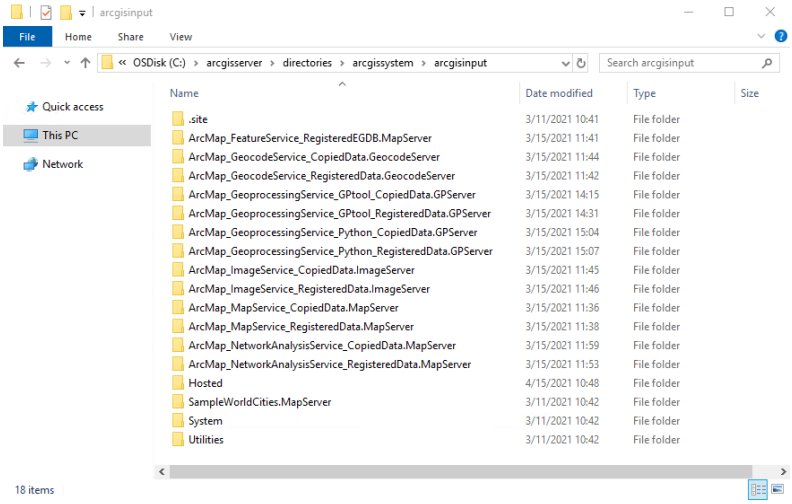
In order to manually republish a feature service, the original source data will need to be added to a project in ArcGIS Pro and then published to ArcGIS Enterprise or ArcGIS Server. All feature services have an associated map service so publishing a feature service from ArcGIS Pro will also include a map service.

Accessing the source data

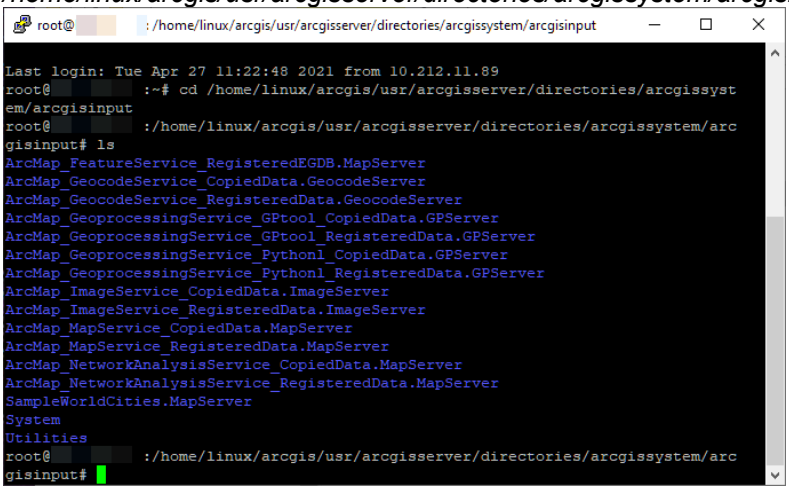
If you don't have the original map document or data the ArcMap-based service was published from, the following steps can be used to obtain it from ArcGIS Server. To access the source data of a feature service, it is necessary to have access to the machine where ArcGIS Server is installed.

1. Sign onto the machine where ArcGIS Server is installed.
2. Navigate to **arcgisinput** folder. This folder contains source information for all the services published to ArcGIS Server.

In Windows, the default folder path is:
C:\arcgisserver\directories\arcgissystem\arcgisinput



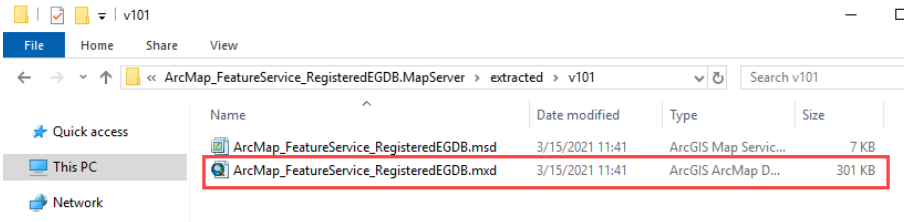
In Linux, the default folder path is:
/home/linux/arcgis/usr/arcgisserver/directories/arcgissystem/arcgisinput



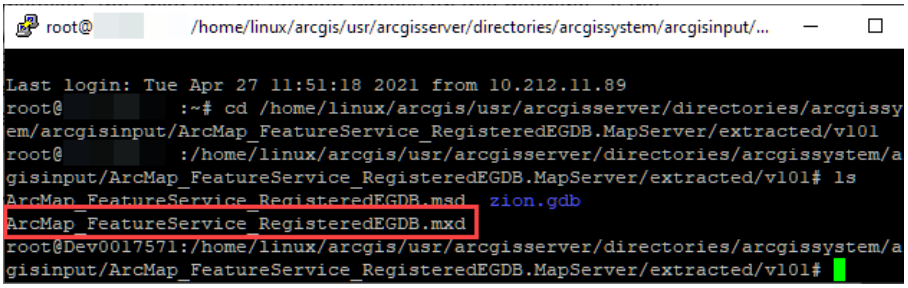
3. Open the folder for the feature service being migrated. Because all feature services have an associated map service, and feature access is a capability enabled on a map service, the service will end in ".MapServer".

   If the service was published to a folder, instead of the root directory, navigate to this folder first.
4. Open the **extracted** folder.
5. Open the **v101** folder.
6. This folder contains a .msd and a .mxd. This workflow will be using the .mxd.

In Windows



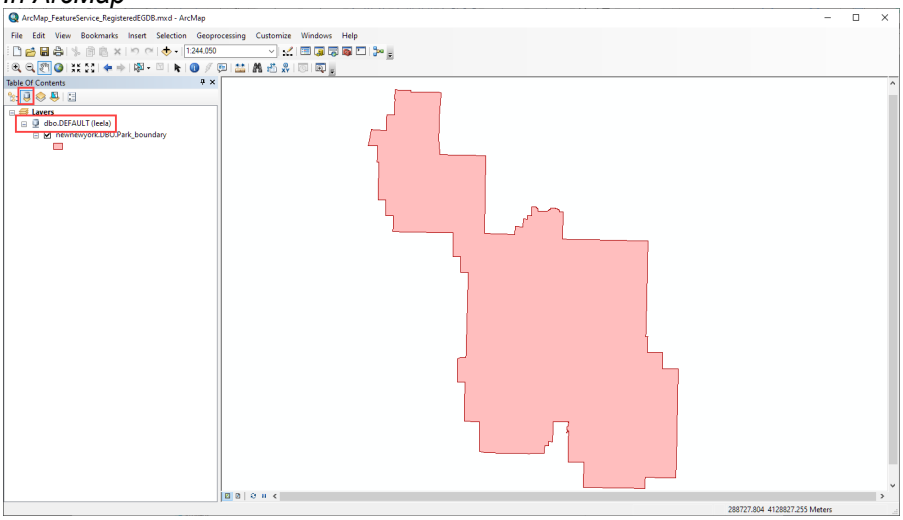
In Linux



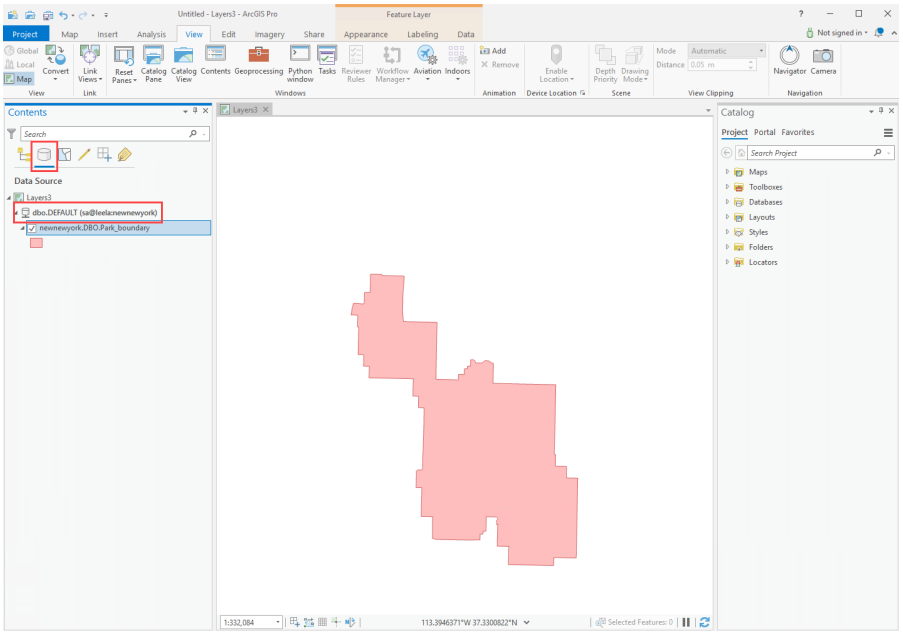
7. Open the .mxd in either ArcMap or ArcGIS Pro.

   If the machine that is hosting ArcGIS Server also has ArcMap or ArcGIS Pro installed, the .mxd can be opened directly on this machine. If the machine that that is hosting ArcGIS Server doesn't have ArcMap or ArcGIS Pro installed, the .mxd will need to be copied to a location accessible by either ArcMap or ArcGIS Pro.
8. Once the .mxd is open, look at the source data. Write down the source information for later reference.

In ArcMap



In ArcGIS Pro



9. Now that the data source for the ArcMap-based service has been recorded, a new feature service can be published or overwritten from ArcGIS Pro.

Before publishing a feature service

Before publishing a new feature service from ArcGIS Pro, check to see if the original data source is still supported. IBM Informix, IBM Db2 for z/OS, and geometric networks are supported as data sources for ArcMap-based services but are not supported as data sources for ArcGIS Pro-based services. They will therefore need to be migrated to a supported data source before publishing a new map service from ArcGIS Pro. If your organization has a requirement for using Informix or Db2 for z/OS, contact your account manager or international distributor

to review database options for ArcGIS Pro-based services. If using a geometric network, see the Convert a geometric network to a trace network section of the documentation for more information on this.

Publishing a new feature service

The steps to publish a new feature service will vary if publishing a new service or overwriting an existing service.

If publishing a new service to ArcGIS Enterprise
See the Share a web feature layer section of the ArcGIS Pro documentation.

If overwriting an existing service in ArcGIS Enterprise
See the Overwrite a web feature layer section of the ArcGIS Pro documentation.

If publishing to a standalone ArcGIS Server
See the Publish a map service section of the ArcGIS Pro documentation, be sure to enable feature access on the map service when publishing.

Geocode services

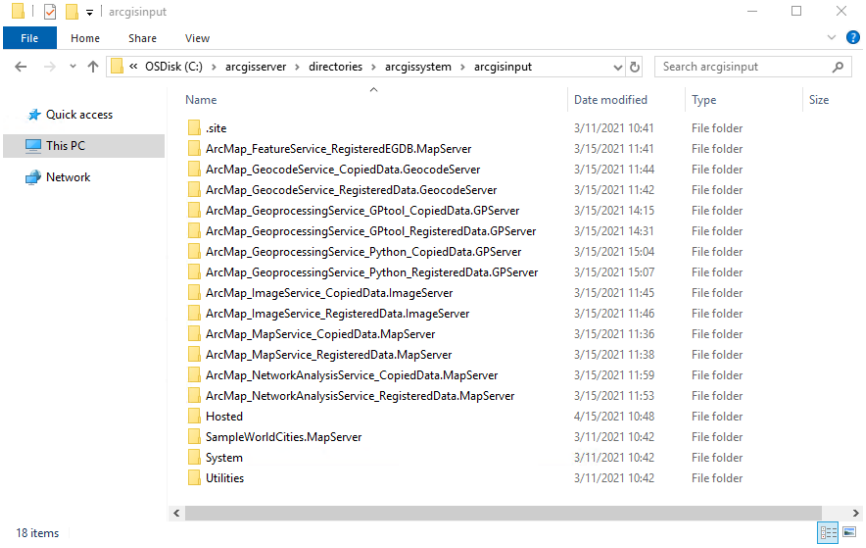
In order to manually republish a geocode service, the original source data will need to be accessed through ArcGIS Pro and then published to ArcGIS Enterprise or ArcGIS Server. It can either be published as a new service or overwritten over the existing ArcMap-based service.

Accessing the source data

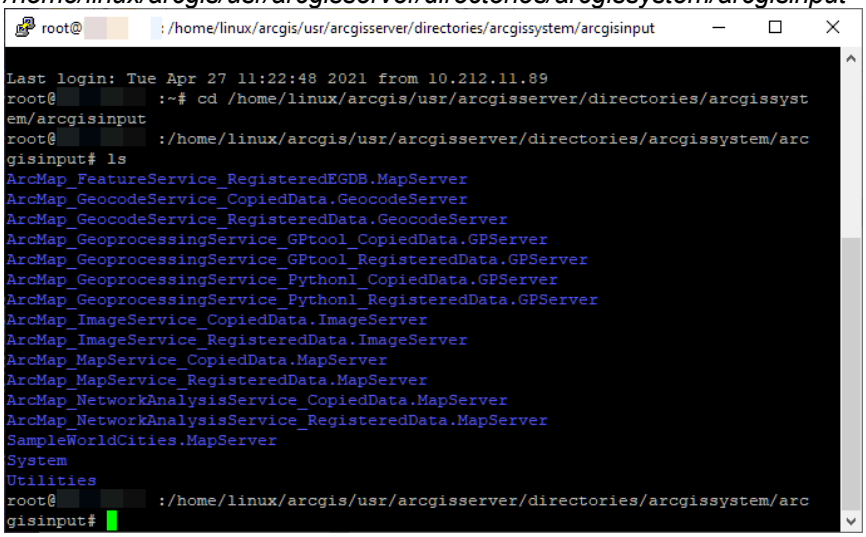
If you don't have the original data the ArcMap-based service was published from, the following steps can be used to obtain it from ArcGIS Server. To access the source data of a geocode service, it is necessary to have access to the machine where ArcGIS Server is installed.

1. Sign onto the machine where ArcGIS Server is installed.
2. Navigate to **arcgisinput** folder. This folder contains source information for all the services published to ArcGIS Server.

   In Windows, the default folder path is:
   C:\arcgisserver\directories\arcgissystem\arcgisinput

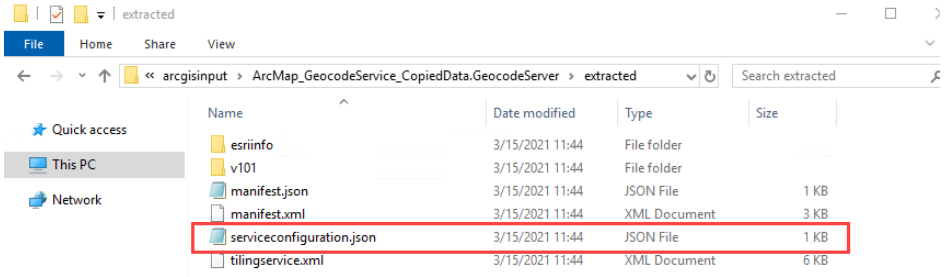


In Linux, the default folder path is:
/home/linux/arcgis/usr/arcgisserver/directories/arcgissystem/arcgisinput

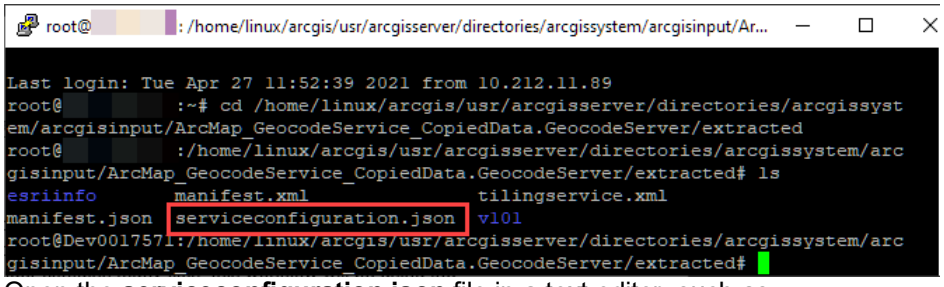


3. Open the folder for the geocode service being migrated.
4. Open the **extracted** folder.
5. This folder contains many files; this workflow will be using the **serviceconfiguration.json** file.

In Windows

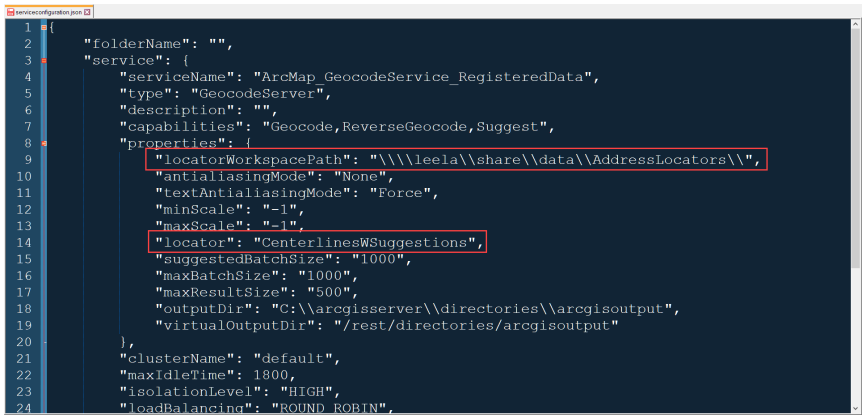


In Linux



6. Open the **serviceconfiguration.json** file in a text editor, such as Notepad++.
7. What is seen next will vary depending on the text editor. Look for the “locatorWorkspacePath” and “locator” parameters. These will be easier to find when the JSON is formatted, using a plugin or online JSON formatter.

The locatorWorkspacePath parameter is the folder or geodatabase from which the address locator was published from. The locator parameter is the name of the address locator that the geocode service was published from. Write down these parameters for later reference; this is the source of the address locator the original geocode service.



8. Now that the data source for the ArcMap-based service has been recorded, a new geocode service can be published to ArcGIS Pro.

Publishing a geocode service

The steps to publish a new geocode service will vary if publishing a new service or overwriting an existing service and if publishing to ArcGIS Enterprise or a standalone ArcGIS Server.

If publishing a new service to ArcGIS Enterprise
See the Share a locator section of the ArcGIS Pro documentation.

If overwriting an existing service in ArcGIS Enterprise
See the Overwrite a locator section of the ArcGIS Pro documentation.

If publishing to a standalone ArcGIS Server
See the Publish a geocode service section of the ArcGIS Pro documentation.

If overwriting an existing service in ArcGIS Server
See the Overwrite a geocode service section of the ArcGIS Pro documentation.

Geodata services

At this time, geodata services cannot be published from ArcGIS Pro to ArcGIS Enterprise.

Geoprocessing services

In order to manually republish a geoprocessing service, everything must be recreated within ArcGIS Pro before publishing to ArcGIS Enterprise or a standalone ArcGIS Server. This is because ArcMap, including its geoprocessing tools, uses Python 2.x and ArcGIS Pro uses Python 3.x. Tools built on Python 2.x cannot be converted to Python 3.x. When the ArcMap-based runtime is removed from ArcGIS Enterprise, Python 2.x will as well; ArcGIS Enterprise will still include Python 3.x alongside the ArcGIS-pro based runtime.

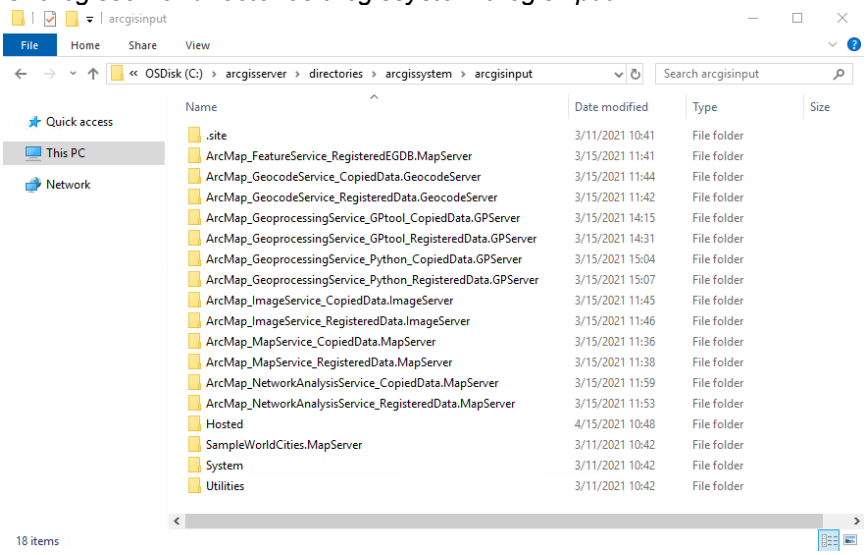
Even though everything must be recreated in ArcGIS Pro, the source data that the ArcMap-based geoprocessing service can still be of help by serving as reference when recreating models or scripts within ArcGIS Pro.

Accessing the source data

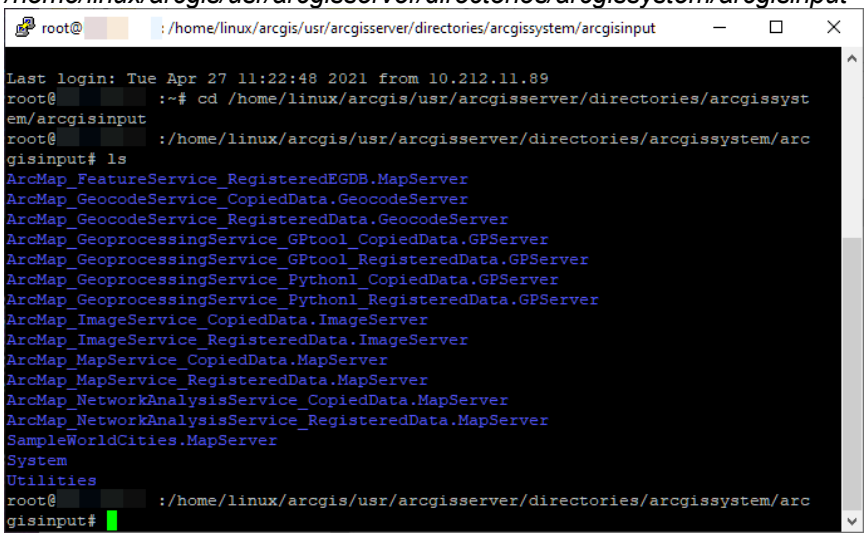
If you don't have the original script or model the ArcMap-based service was published from, the following steps can be used to obtain it from ArcGIS Server. To access the source data of a geocode service, it is necessary to have access to the machine where ArcGIS Server is installed.

1. Sign onto the machine where ArcGIS Server is installed.
2. Navigate to **arcgisinput** folder. This folder contains source information for all the services published to ArcGIS Server.

   In Windows, the default folder path is:
   C:\arcgisserver\directories\arcgissystem\arcgisinput



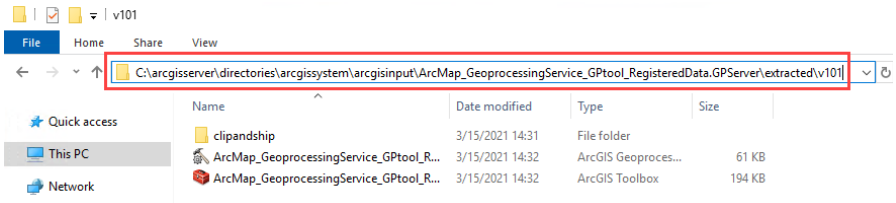
In Linux, the default folder path is:
/home/linux/arcgis/usr/arcgisserver/directories/arcgissystem/arcgisinput



3. Open the folder for the geoprocessing service being migrated.
4. Open the **extracted** folder.
5. Open the **v101** folder.
6. Write down this folder path for later reference.

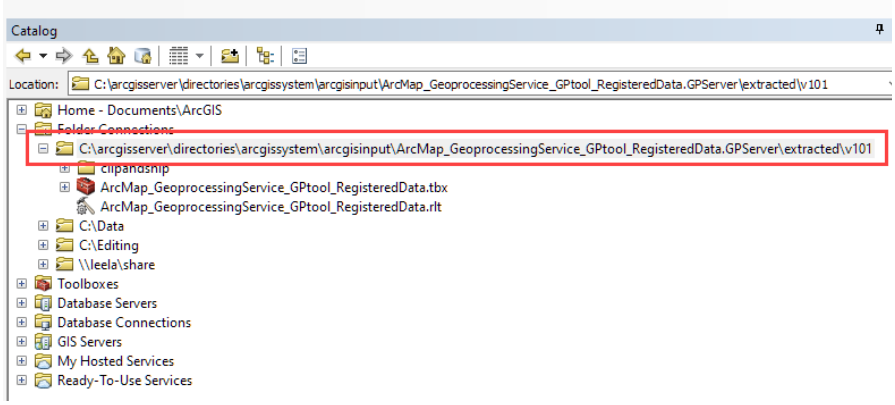
This folder path will need to be accessible from ArcMap. If the machine that that is hosting ArcGIS Server doesn't have ArcMap installed, the v101 folder will need to be copied to a location accessible by ArcMap.

In this Windows example, the folder path is:
C:\arcgisserver\directories\arcgissystem\arcgisinput
ArcMap_GeoprocessingService_GPtool_RegisteredData.GPServer
extracted\v101



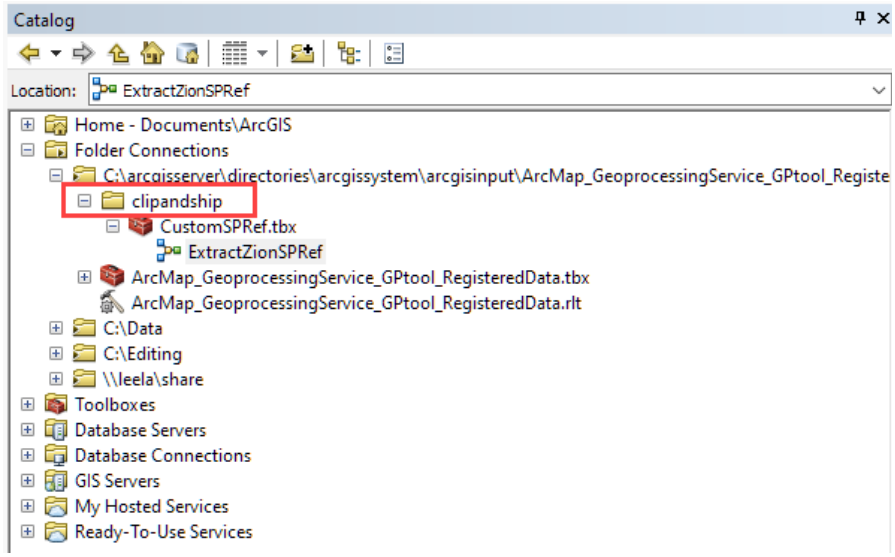
In this Linux example, the folder path is: /home/linux/arcgis/usr/arcgisserver/directories/arcgissystem/arcgisinput/ArcMap_GeoprocessingService_GPtool_RegisteredData.GPServer/extracted/v101

7. Open ArcMap.
8. Through ArcCatalog, connect to the folder written down in step 6.



9. This v101 folder contains a folder and a toolbox. Open the folder.

In this example, the folder is named "clipandship".



10. Within this folder is a toolbox. It will contain either the model or the script that was used to publish the geoprocessing service. This content can be used for reference when recreating the inputs for the geoprocessing service in ArcGIS Pro.

Tips for migrating from ArcMap to ArcGIS Pro

See the ModelBuilder: migration to ArcGIS Pro and Python migration from 10.x to ArcGIS Pro sections of the ArcGIS Pro documentation for more information and tips for migrating geoprocessing tools from ArcMap to ArcGIS Pro.

Publishing a new geoprocessing service

The steps to publish a new geoprocessing service will vary if publishing a new service or overwriting an existing service and if publishing to ArcGIS Enterprise or a standalone ArcGIS Server.

If publishing to ArcGIS Enterprise

See the Publish web tools in ArcGIS Pro section of the ArcGIS Pro documentation.

If publishing to a standalone ArcGIS Server

See the Publish geoprocessing services in ArcGIS Pro section of the ArcGIS Pro documentation.

Image services

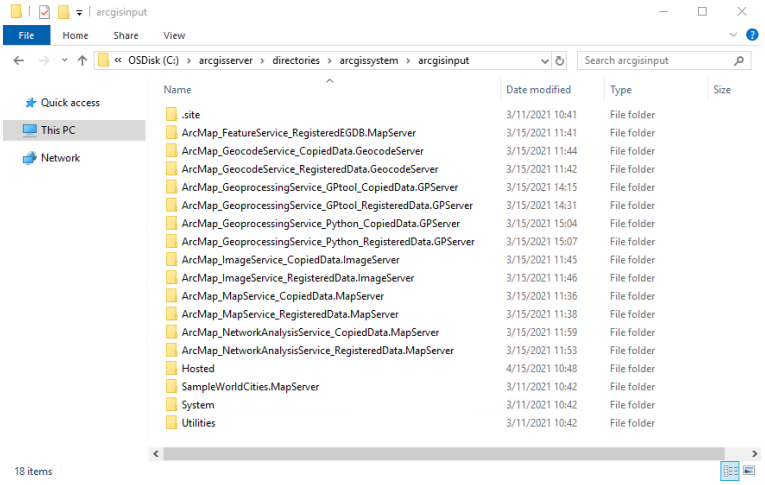
In order to manually republish an image service, the original source data will need to be accessed in ArcGIS Pro.It can either be published as a new service or overwritten over the existing ArcMap-based service Depending on the source data, some further steps may need to be taken before publishing to ArcGIS Enterprise or a standalone ArcGIS Server

Accessing the source data

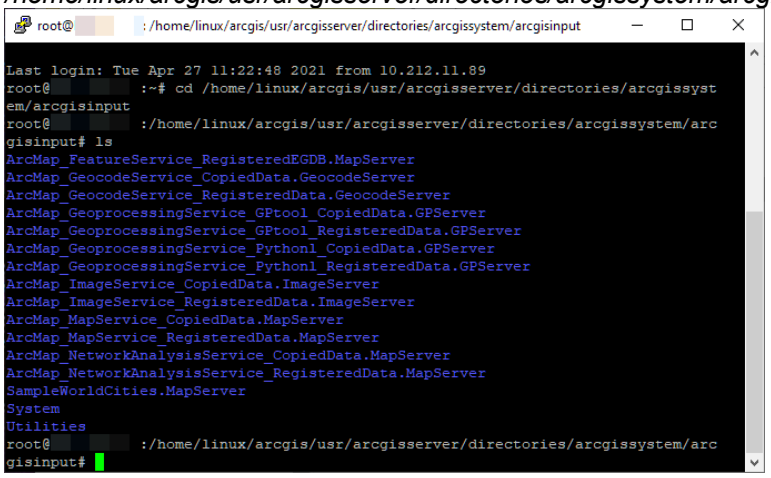
If you don't have the original data the ArcMap-based service was published from, the following steps can be used to obtain it from ArcGIS Server. To access the source data of an image service, it is necessary to have access to the machine where ArcGIS Server is installed.

1. Sign onto the machine where ArcGIS Server is installed.
2. Navigate to **arcgisinput** folder. This folder contains source information for all the services published to ArcGIS Server.

In Windows, the default folder path is:
C:\arcgisserver\directories\arcgissystem\arcgisinput

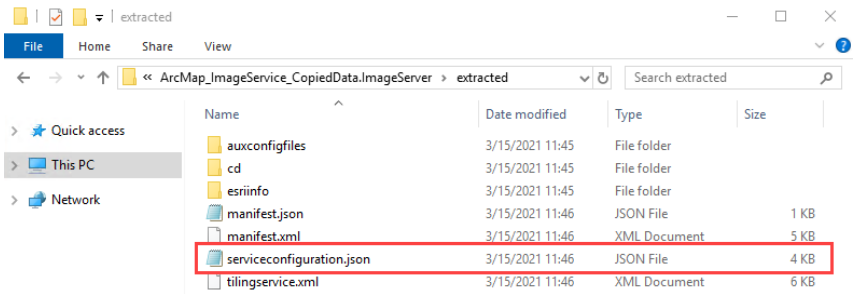


In Linux, the default folder path is:
/home/linux/arcgis/usr/arcgisserver/directories/arcgissystem/arcgisinput

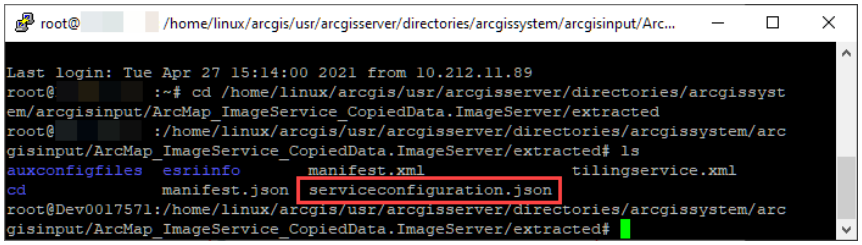


3. Open the folder for the image service being migrated.
4. Open the **extracted** folder.
5. This folder contains many files; this workflow will be using the **serviceconfiguration.json** file.

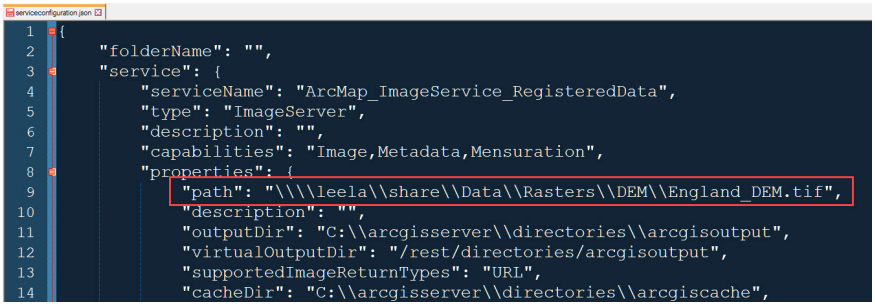
In Windows



In Linux

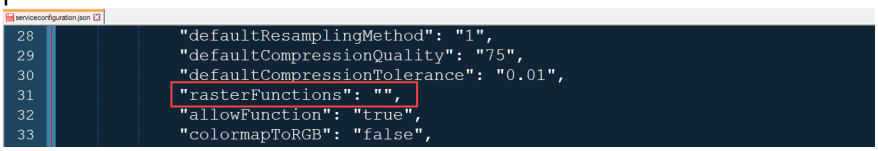


6. Open the **serviceconfiguration.json** file in a text editor, such as Notepad++.
7. What is seen next will vary depending on the text editor. Look for the "path" parameter. These will be easier to find when the JSON is formatted, using a plugin or online JSON formatter. The path parameter is the folder or geodatabase from which the image service was published from. Write down this parameter for later reference; this is the source of the raster that is the source for the original image service.



8. Scroll down to see if the image service is configured to use a raster function(s) template. Look for the "rasterFunctions" parameter

   If no raster function is configured, you will see the "rasterFunctions" parameter is blank.



   If a raster function is configured you will see a path denoting where the function template(s) (*.rft.xml) is stored.

   Write down this parameter for later reference; this is the path(s) to raster function(s).
9. Now that the data source for the ArcMap-based service has been recorded, a new image service can be published from ArcGIS Pro.

Before publishing a new image service

Before publishing a new image service from ArcGIS Pro, check to see if the original data source a raster catalog. ArcGIS Pro no longer supports raster catalogs so if the data is coming from a raster catalog, it will need to be migrated to a mosaic dataset. See the Migrate a raster catalog to a mosaic dataset section of the documentation for more information on this.

Publishing a new image service

The steps to publish a new map service will vary if publishing a new service or overwriting an existing service and if publishing to ArcGIS Enterprise or a standalone ArcGIS Server. If raster functions were present in the original service, they can be configured once the new image service has been published.

If publishing a new service to ArcGIS Enterprise
See the Share web imagery layer section of the ArcGIS Pro documentation.

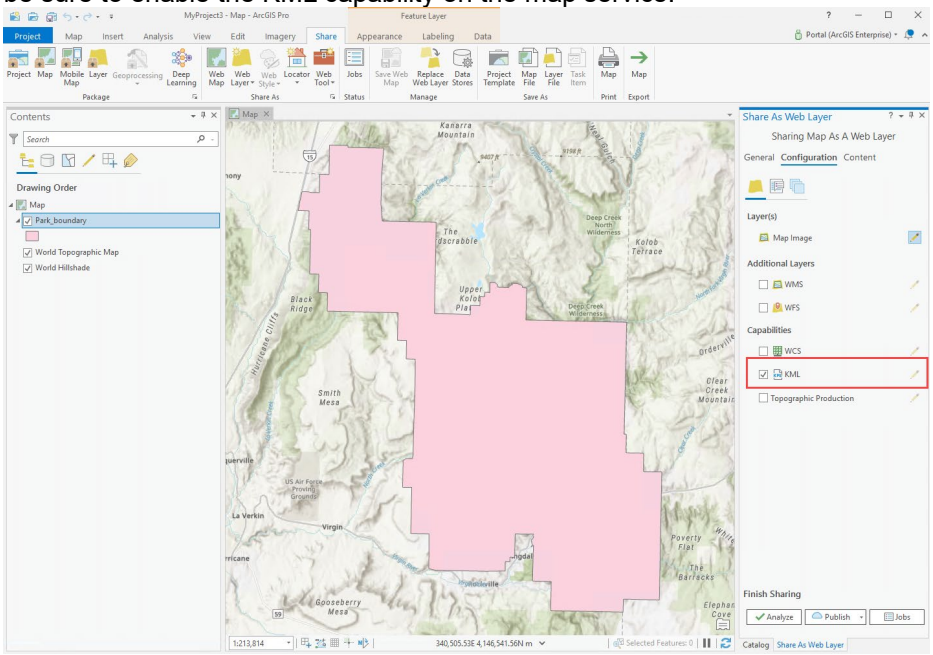
If publishing to a standalone ArcGIS Server
See the Publish an image service section of the ArcGIS Pro documentation.

If overwriting an existing service in ArcGIS Server
See the Overwrite an image service section of the ArcGIS Pro documentation.

If your image service was configured to use a raster function template
Once your new image service has been published, see Server-side processing with raster functions section of the ArcGIS Enterprise documentation.

KML services

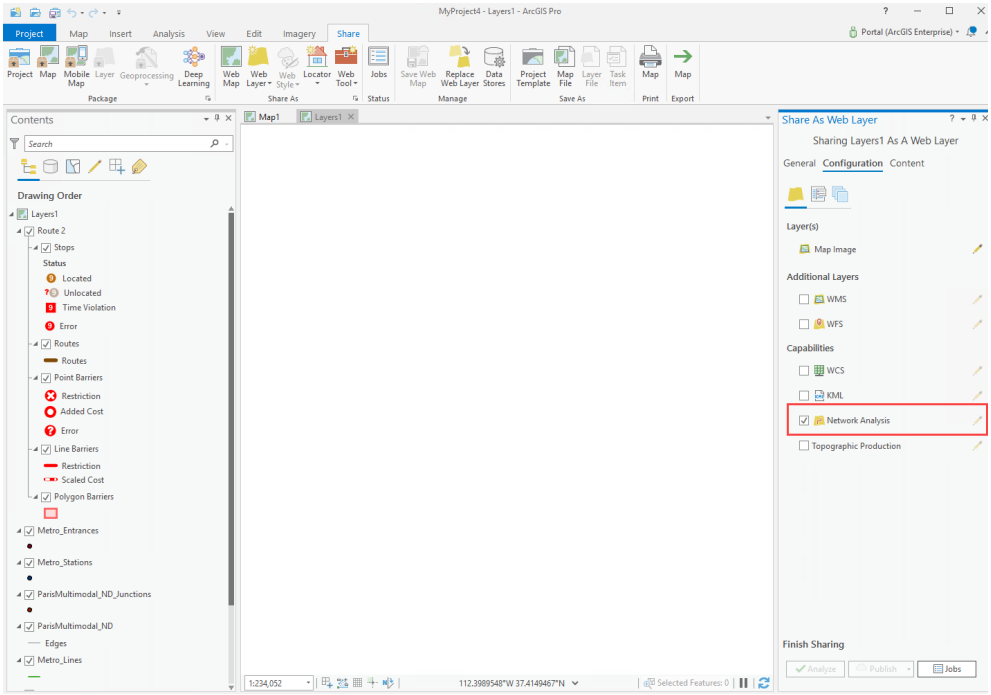
KML is a capability that can be enabled on map services. In order to migrate a KML service, follow the steps for migrating a map service. When republishing, be sure to enable the KML capability on the map service.



For more information, see the Additional layers and capabilities section of the ArcGIS Pro documentation.

Network analysis services

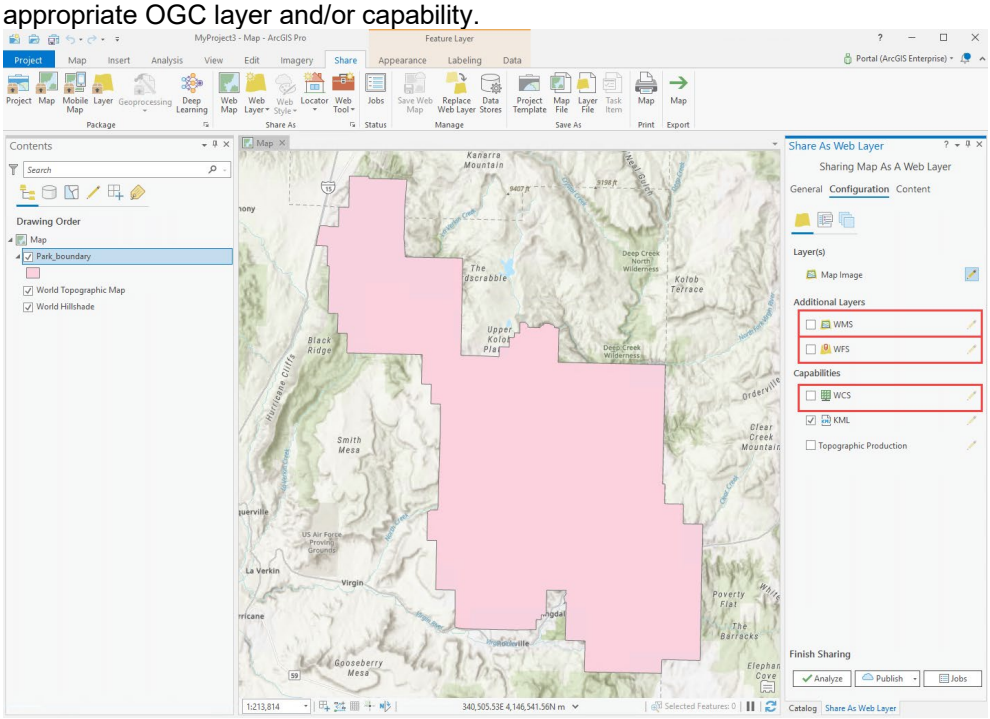
Network analysis is a capability that can be enabled on map services. In order to migrate a network analysis service, follow the steps for migrating a map service. When republishing, be sure to enable the network analysis capability on the map service.



For more information, see the Publish a map service in ArcGIS Pro with the network analysis capability section of the ArcGIS Enterprise documentation.

OGC services

OGC services are layers and capabilities that can be enabled on map and image services. In order to migrate an OGC service, follow the steps for migrating a map service or image service. When republishing, be sure to enable the appropriate OGC layer and/or capability.



For more information, see the Additional layers and capabilities section of the ArcGIS Pro documentation.

Scene services

Scene services cannot be published through ArcMap; there is no migration workflow necessary for scene services.

Schematics services

At this time, schematic services cannot be published from ArcGIS Pro to ArcGIS Enterprise.

Stream services

Stream services cannot be published through ArcMap; there is no migration workflow necessary for stream services.

Utility network services

Utility network services cannot be published through ArcMap; there is no migration workflow necessary for utility network services.

Vector tile services

Vector tile services cannot be published through ArcMap; there is no migration workflow necessary for vector tile services.

Services with SOEs and SOIs

While there are many similarities between the ArcObjects .NET and Java SDKs and ArcGIS Enterprise SDK, they have distinct but different APIs. With this in mind, all services with an ArcObjects server object extension (SOE) or server object interceptor (SOI) will need to be migrated to use the ArcGIS Enterprise SDK.

For more information, see the Migrating ArcObjects SOEs and SOIs to ArcGIS Enterprise SDK blog. Additionally, see the Migration strategies and Migration steps sections of the ArcGIS Enterprise SDK documentation.

Conclusion

If you are unable to migrate your ArcGIS Server services to use the ArcGIS Pro-based runtime at this time, you should keep ArcGIS Enterprise at a version that contains both the ArcMap and ArcGIS Pro-based runtimes until you are ready to fully move to ArcGIS Pro-based services. This means remaining on ArcGIS Enterprise 10.9.x, or earlier. ArcGIS Enterprise 10.9.1 will follow the long-term support product life cycle, ensuring support into 2027.

Keep in mind that it is possible to use older ArcGIS Server sites with a newer ArcGIS Enterprise deployment. It will, as an example, be possible to federate ArcGIS Server 10.9.1 to a later ArcGIS Enterprise deployment. This provides an option for keeping some services on an older release while continuing to be able to upgrade the base ArcGIS Enterprise deployment.

While the current versions of ArcGIS Enterprise still include the ArcMap and ArcGIS Pro-based runtimes, it is never too early to start planning and preparing for a release of ArcGIS Enterprise, or just ArcGIS Server, with only the ArcGIS Pro-based runtime.

esri | THE SCIENCE OF WHERE®

Esri, the global market leader in geographic information system (GIS) software, offers the most powerful mapping and spatial analytics technology available.

Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organizations including the world's largest cities, most national governments, 75 percent of Fortune 500 companies, and more than 7,000 colleges and universities. Esri engineers the most advanced solutions for digital transformation, the Internet of Things (IoT), and location analytics to inform the most authoritative maps in the world.

Visit us at esri.com.

Contact Esri

380 New York Street
Redlands, California 92373-8100 USA

1 800 447 9778
T 909 793 2853
F 909 793 5953
info@esri.com
esri.com

Offices worldwide
esri.com/locations

For more information, visit **esri.com**.