Engineer

ArcGIS

Esri's commercial GIS platform

What it is

ArcGIS is the name Esri gives to a whole family of geospatial software rather than to one program, and the parts are easiest to tell apart by where each one runs.

On the desktop the current application is ArcGIS Pro, and its system requirements list Microsoft Windows and nothing else. Before Pro came ArcMap, part of what was sold as ArcGIS Desktop. Esri's life-cycle page lists ArcMap as deprecated and in mature support, with 10.8.x as its final series of releases.

On a server, the centre of the platform is a portal: the place where content, users, groups and data services are created and shared. Esri hosts one as ArcGIS Online, a subscription software-as-a-service product, and an organisation can run its own with ArcGIS Enterprise. Data in a portal is published as services, each with its own REST endpoint. A feature service gives access to spatial and non-spatial data in feature layers and tables and lets a client add, update, delete and query features. Vector tile and map tile services store and serve tiles, and an image service processes and mosaics raster data on the fly. Every layer has an address of its own, of the form `…/FeatureServer/0`, and a `query` operation that takes a `where` clause, a list of fields and an output format: HTML by default, JSON, GeoJSON or protocol buffers.

On the client side, Esri publishes Maps SDKs for JavaScript, Kotlin, Swift, Flutter, .NET, Qt and Java, plus plugins for Unity and Unreal Engine. The same developer documentation also covers open libraries that can draw ArcGIS services, namely Leaflet, MapLibre GL JS, OpenLayers and CesiumJS. For scripting there is ArcPy, the Python package for geoprocessing tools and map automation inside ArcGIS Pro, beside the ArcGIS API for Python and ArcGIS REST JS for working with portals and services from outside it. Access to anything that is not public goes through API keys, OAuth 2.0 or a signed-in user.

On disk, the format that travels with ArcGIS data is the file geodatabase: a directory whose name ends in `.gdb`, holding each of its tables as `.gdbtable` files inside it. Outside Esri's software, GDAL's built-in OpenFileGDB driver reads file geodatabases, has written and updated them since GDAL 3.6, and has handled raster layers in them since 3.7.

Use the concept in a decision

Put "What is ArcGIS?" to work in a real decision. We can help relate the concept to the system you are building or buying. Anything that happens in a place — vessels, vehicles, plots, sensors — put on a map you can search, measure and share.

Explore our services Get in touch →

Test the assumptions behind the term

Use the explanation and linked work to frame questions for your project. We can examine the assumptions with you before a tool is chosen. Made a geographical data pipeline 50x faster — 50x faster geographical data pipelines

Made a geographical data pipeline 50x faster Get in touch →

Why it matters

When an organisation already runs ArcGIS, the decision is seldom whether to adopt it. The decision is where its edge sits: which data stays in the portal as services, which is copied into a database the rest of the stack controls, and in which direction edits flow between the two.

Inside that edge, a lot comes ready-made. Editing, symbology, sharing with named users and groups, analysis services and low-code app builders all work against the same portal, and staff who know ArcGIS Pro can keep working the way they already do. Publishing a layer as a feature service gives every other system an address to read it from.

The edge is crossable from both sides, and that makes the choice a real one rather than a lock-in. A feature service speaks JSON and GeoJSON over plain HTTP. GDAL's ESRIJSON driver reads a feature service URL like a file and pages through the result on its own, so `ogr2ogr` can copy a hosted layer into PostGIS or a GeoPackage in one command. Esri's own documentation shows Leaflet and MapLibre GL JS drawing its services. In the other direction, GDAL has written file geodatabases itself since 3.6, so data can go back in Esri's own format.

What costs effort is everything that lives on both sides at once. A layer copied out of a portal is a second copy, and a second copy needs a schedule, an owner and a way to tell when it has drifted from the first. The desktop is Windows-only and commercially licensed, which shapes who on a mixed team can open a

project. And ArcPy ships with ArcGIS Pro and ArcGIS Server; even installed into another Python environment it still needs ArcGIS Pro on the machine, so a pipeline built on it runs only where ArcGIS does.

What it looks like in practice

ArcGIS turns up in two projects on this site, and in neither is it the whole stack.

From 2015 to 2022, the GIS Software Development Team Lead role carried more than thirty GIS projects from development through deployment to support. Some of their web maps called the ArcGIS APIs, and others the HERE APIs. The maps themselves were drawn with Mapbox GL and Leaflet, and the application code around them was written in JavaScript, Python, PHP and SQL. The spatial data lived in PostgreSQL with PostGIS, and QGIS and JOSM handled the hands-on data work, so ArcGIS sat beside that stack as a set of APIs the maps could call.

From 2022 to 2024, as a Data Engineer on a large-scale geospatial analytics project, ArcGIS was one of the tools for repair. Spatial errors were diagnosed and corrected using GDAL, QGIS and ArcGIS in combination, with recurring cleaning tasks automated in Bash. PL/pgSQL and Transact-SQL procedures managed and transformed the geographic and temporal data in PostgreSQL and SQL Server, with PostGIS carrying the spatial queries and indexing. That repair work, ArcGIS included, closed more than 1,000 issues and helped cut spatial query run times by 35%.

Where it goes wrong

Most of the trouble sits at the edge between ArcGIS and everything else, where each side assumes the other behaves like itself.

A layer download stops at a round number. A feature service returns at most `maxRecordCount` features per request, a limit set per service. When a query matches more, the response sets `exceededTransferLimit` to `true`, and a client that reads the features and ignores that flag holds a partial layer that looks complete. Where the layer reports `supportsPagination`, the client pages with `resultOffset` and `resultRecordCount`, or with `resultPaginationToken`, until the flag comes back `false`. GDAL's documentation adds that paging is reliable only with a sort on a field such as `OBJECTID`:

```
url='https://gis.example.org/arcgis/rest/services/Parcels/FeatureServer/0'
q='query?where=1=1&outFields=*&orderByFields=OBJECTID+ASC&f=json'
ogr2ogr -f GPKG parcels.gpkg "ESRIJSON:$url/$q"
```

Coordinates arrive in metres where degrees were expected. Without an `outSR` parameter, a query returns geometry in the spatial reference of the service's map, which may be a projected system measured in metres. For GeoJSON output, the reference says that from 10.8 the result follows RFC 7946 only when `outSR` is left out or set to 4326. Any other value returns projected coordinates in a file that still calls itself GeoJSON, and a web map reading it will place features far from where they belong. Ask for `outSR=4326` whenever the consumer expects longitude and latitude.

An ArcMap script stops working in ArcGIS Pro. ArcGIS Desktop, which includes ArcMap, used versions of Python 2, and ArcGIS Pro runs Python 3, a line Esri describes as only partially compatible. Within ArcPy, the `arcpy.mapping` module was removed and replaced by `arcpy.mp`. With ArcMap deprecated, scripts written for it are a migration waiting to happen. Pro's Analyze Tools For Pro tool flags the issues that would keep Python code, or geoprocessing tools built on Python, from running, and doing that pass on purpose beats discovering it the day a machine is replaced.

A file geodatabase opens read-only. GDAL before 3.6 could read a file geodatabase through OpenFileGDB but write one only through the separate FileGDB driver, which needs Esri's FileGDB API library at build time. Raster layers inside a `.gdb` need GDAL 3.7 or later. When a pipeline writes a `.gdb` on one machine and fails on another, compare the GDAL versions and driver lists before blaming the data.

Further reading

- Developer documentation — Esri's map of the platform: SDKs, portal and data services, and security.
- Query (Feature Service/Layer) — every query parameter, including `outSR`, the output formats and the three ways to page.
- Python migration from 10.x to ArcGIS Pro — what changed between Python 2 and 3 and in ArcPy itself.
- ArcMap Life Cycle — the support status of ArcMap and why 10.8.x is the last series.

- ESRI File Geodatabase vector (OpenFileGDB) — GDAL's driver for `.gdb` directories, with the versions that added writing and raster support.
- ESRIJSON / FeatureService driver — reading feature service results with GDAL, and how its automatic paging works.

Glossary

Choose for your actual constraints

Describe the workflow, the existing interfaces and the users who need the change. We can define a testable delivery and a handover that lets your team maintain it.

See what it costs Get in touch →

Make the terminology practical

Ask how "What is ArcGIS?" applies to your organisation. A concrete example from your current system is enough to start the discussion.

Explore our services

welcome@engineer.company +45 50 10 61 84 Copenhagen, Denmark

Take this page with you

Contact card

Carefully Crafted With Love by D.

CVR 45969703 · Tagensvej 105C, 3. th, 2200 København N

Copyright © 2025 – present · Engineer ApS · All rights reserved.

Printed from https://engineer.company/glossary/arcgis/