04b. Map Services and SOA

GE3238 GIS Design and Practices
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Learning Objectives

- Map services
  - Web GIS functionalities via Desktop GIS (ArcGIS Pro in this context)
- Common types of map services
  - Specifications with prescribed capabilities
  - ArcGIS Pro and ArcGIS Online as demonstrations

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Desktop GIS versus Web GIS

Web GIS is any GIS that uses Web technology to communicate between components, which include:

(1) Server

(2) Client (e.g., a browser, a desktop app, or a mobile app)

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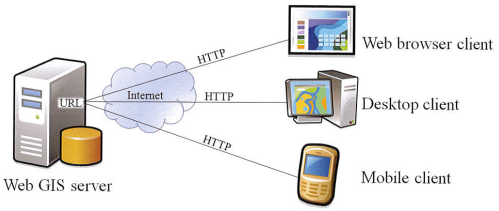
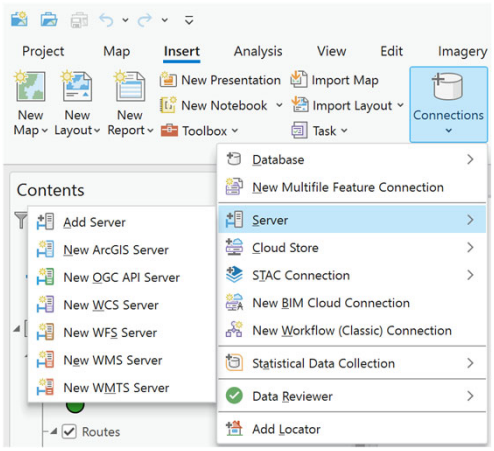
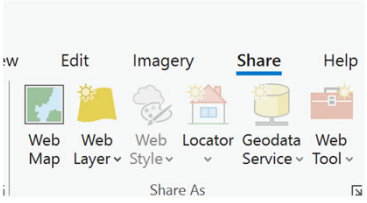
Apparently this is possible







What enables the communication for the two parties that do not see each other at creation?

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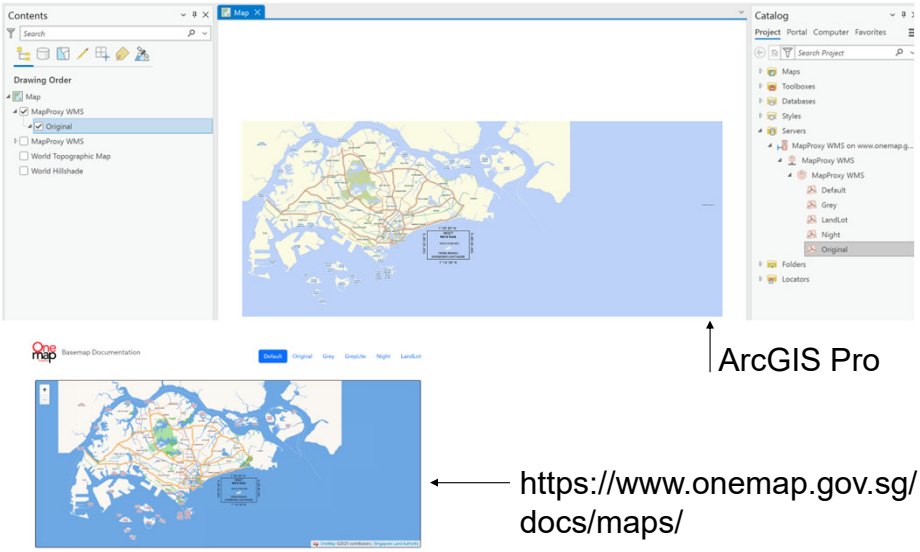
Example – Singapore's Onemap



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SOA

- Architecture that is based on integrating loosely coupled, interoperable services
  - Loosely coupled means NOT physically bound
  - Service means a (computer) program that can be interacted with well-defined message exchanges
- These services can be invoked and consumed remotely over a network

Key terms

Loosely coupled
Service

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Accessing Services

- Client
  - Web browser: ArcGIS Online, ready-made program using (Open Layer Mapping) API, …
  - Desktop: ArcGIS Pro, Quantum GIS, …
  - … (e.g., mobile device)
- End point
  - An entry point of the service implementation
- Services
  - Map service, feature service, image service, …

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Key terms

Client
End point

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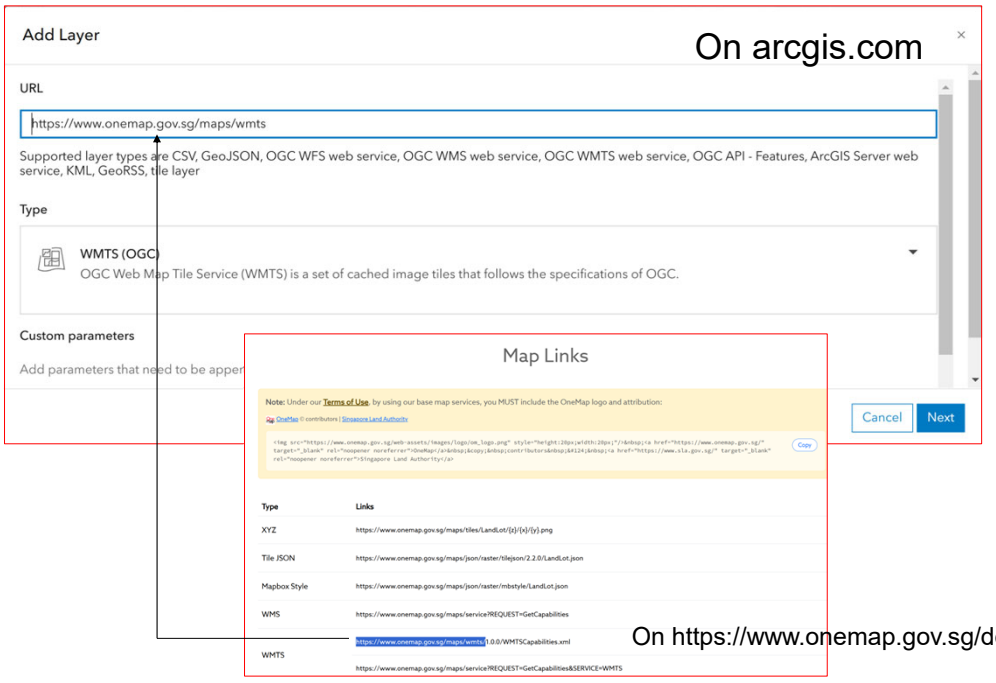

Key terms

URL (End point)
Web Service

On https://www.onemap.gov.sg/docs/maps/landlot.html

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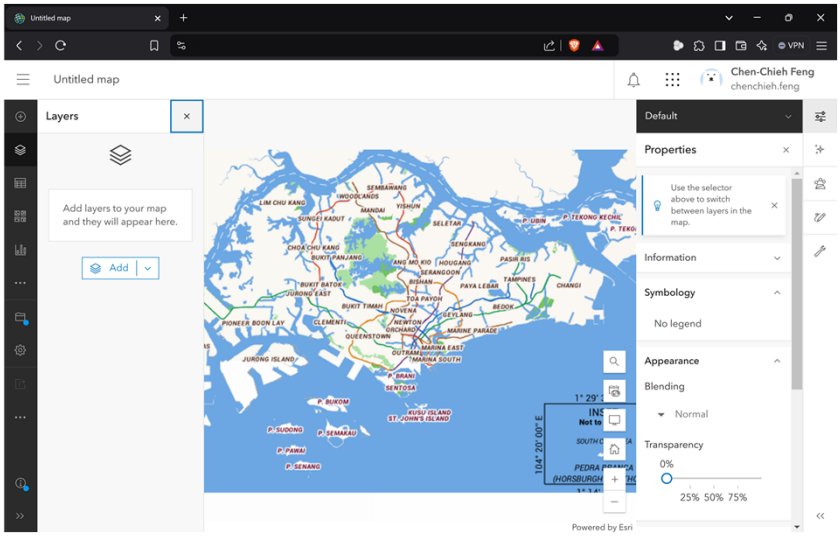
WMTS in ArcGIS Online



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Common Services related to GIS

Service Types

- Map Service
- Map Tile Service
- Feature Service
- Image Service
- Processing Service

OGC* standards

- Web Map Service (WMS)
- Web Map Tile Service (WMTS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Web Processing Service (WPS)

Key terms

Map service
Feature service
Image service

ArcGIS has its own implementations of these services, but it also supports OGC standards

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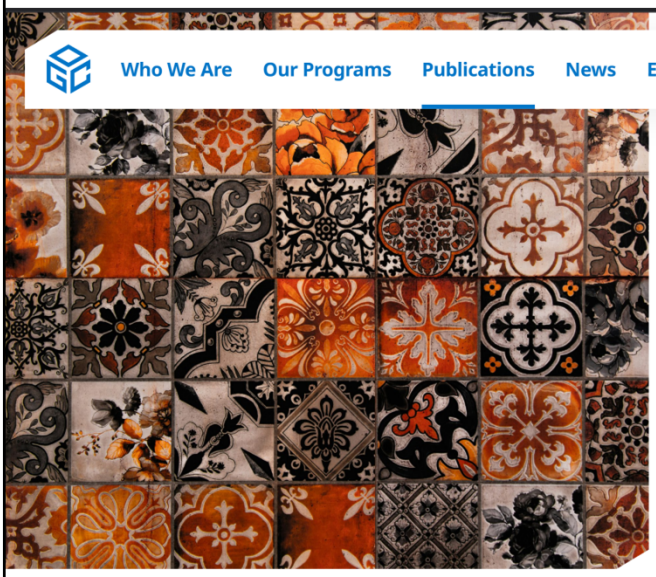

- https://www.ogc.org/publications/standard/wmts/

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- This WMTS standard offers a standardized approach to declaring the images which a client can request from a server, enabling a single type of client to be developed for all servers

Some WMS servers have already embarked on this road, developing their own tiling structures built by constraining WMS GetMap requests to a fixed set and then advertising those constraints in their service metadata. Although this mechanism enables those servers to scale as just described, the tiling structure and the advertising and discovery mechanisms are not standardized. That unfortunately limits interoperability and forces developers to build, for each server, special clients that can understand the server advertised constraints and limit the WMS GetMap requests issued by the client to exactly

the requests understood by the particular server. This WMTS standard offers a standardized approach to declaring the images which a client can request from a server, enabling a single type of client to be developed for all servers. While developing a profile of WMS was initially considered, limiting a WMS in the ways important to allow efficient access to cacheable tiles proved awkward while forcing implementors to read both a standard and a profile seemed less efficient than developing this stand alone specification.

https://portal.ogc.org/files/?artifact_id=35326

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Map Tile Service

- Map Server renders the requested map internally and converts to an image file (e.g., JPG, PNG, GIF) and returns the map image to the client for display
- Maps are pre-rendered and stored as a series of small tiles at several predefined scales

Key terms

Map service
Image tile

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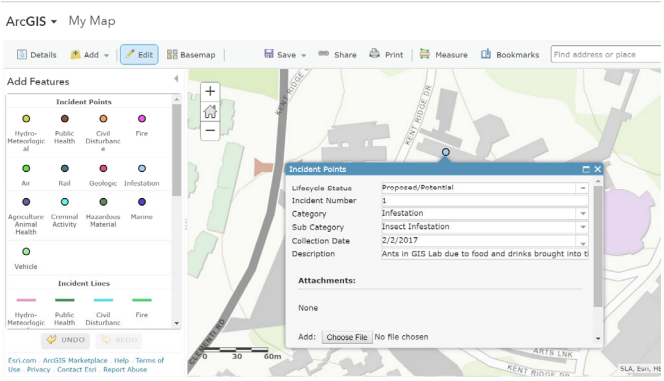
Feature Service

- Client requests features from one or more layers within a specified geographic extent
- Capabilities
  - Provides symbology
  - Client can execute queries to get features and perform edits that can be applied to the server
  - Data from non-spatial tables can also be queried and edited



Key terms
Feature service
Query and editing capability

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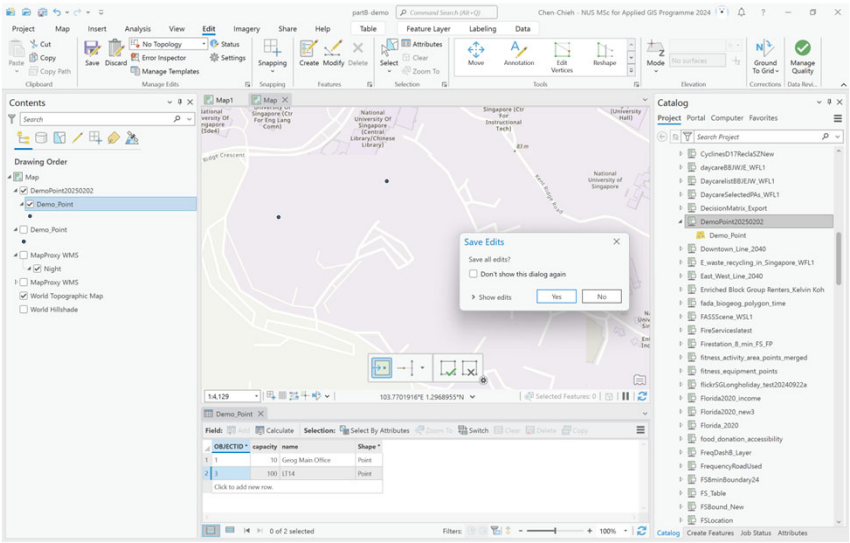
WFS in ArcGIS Pro



Key terms

Feature layer

Edit (enabled)

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Image Service

- Image service shares image or raster data
- Capabilities
  - Can be used for display or analysis
  - Supports query, on-the-fly processing, viewing footprints, previewing each raster, downloading, and editing
  - Capabilities managed by the parameters of the service

https://pro.arcgis.com/en/pro-app/latest/help/sharing/overview/configure-an-image-service.htm

Key terms

Image service

Raster

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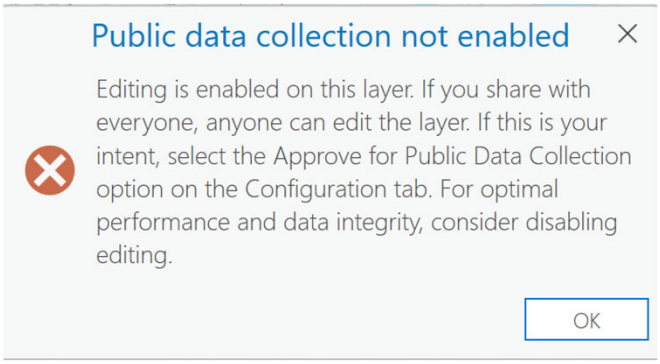
Is there a justification to support data sharing (only) without editing capability?

(Alternatively, why do we separate WMS from WFS?)



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Take home message

- Implication of being able to share data?
  - Data integration across different parties
  - Enable collaboration
  - Cross-platform access
  - Cost saving

- Web GIS
  - Web GIS functionalities via Desktop GIS
- Common types of GI services
  - Specifications with prescribed capabilities

Enabler

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Supplement Questions

- How about spatial analysis? Can you use analysis from online sources?

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