ArcGIS Enterprise: Data Storage Strategies

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2021 ESRI DEVELOPER SUMMIT

Agenda

- What is a data strategy and why do you need one?
- ArcGIS Enterprise data landscape and architecture
- Working with data strategy building blocks

Note as the ArcGIS software evolves, so does the data that powers it!

Questions

Should I be moving all my data to the cloud?

Should I use the ArcGIS Data Store instead of my Enterprise geodatabase?

Should I convert all my shapefiles?

The Why, How, What…

WHY
-Goal
-Audience

***HOW** will my data be….*
-Modeled
-Collected or captured
-Stored
-Maintained
-Secured and shared

WHAT
-Software applications
-Tools
-Data
-Documentation
-Engineers

What is a data strategy?

A comprehensive plan for how your organization will *collect*, *store*, *access*, and *manage*, *analyze* and *share* your GIS data.

A data strategy is *feasible*, *integrated, tailored* to your workflows and users, and *evolves* as necessary.

Buffet of dishes

Start with the end goal

And then work backwards

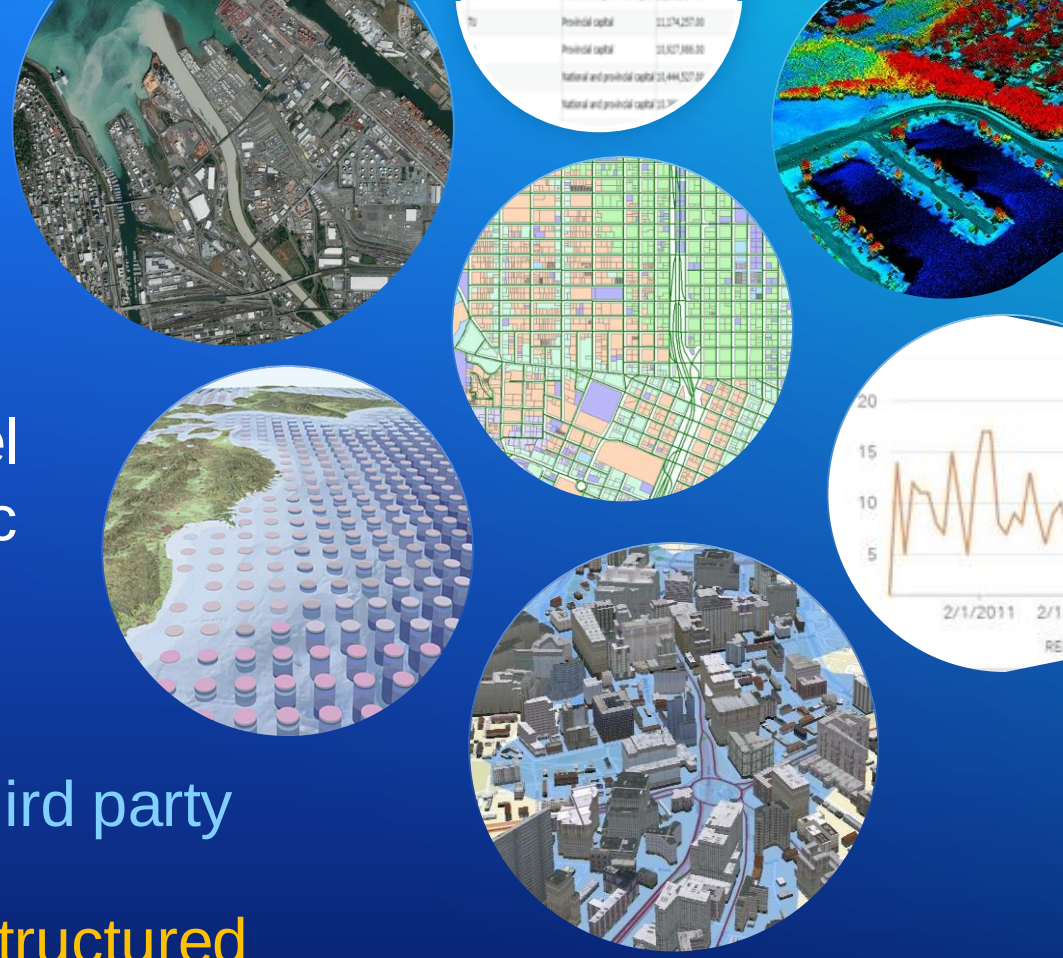
- **The end goal**
  - *Dish XYZ for the buffet*
  - *Persons with no allergies*

- **Put the pieces together**
  - *Recipe and ingredients*
  - *Tools, kitchen, cooks*
  - *Dish XYZ on the menu*

ArcGIS data landscape and architecture

Software and data evolving together

ArcGIS Enterprise data types today



Urban

Imagery

3D

Parcel Fabric

Raster

Real-time

Big data

Field

Indoor

Demographic

Third party

Living Atlas

Unstructured

Vector & tabular

Cloud

Utility networks

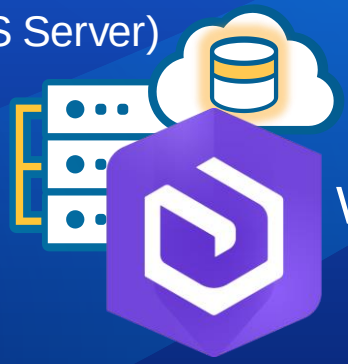
Drone

ArcGIS Enterprise supports your data workflows

ArcGIS software advances drive data evolution

Web GIS
(ArcGIS Online)

Shared web services
(ArcGIS Server)

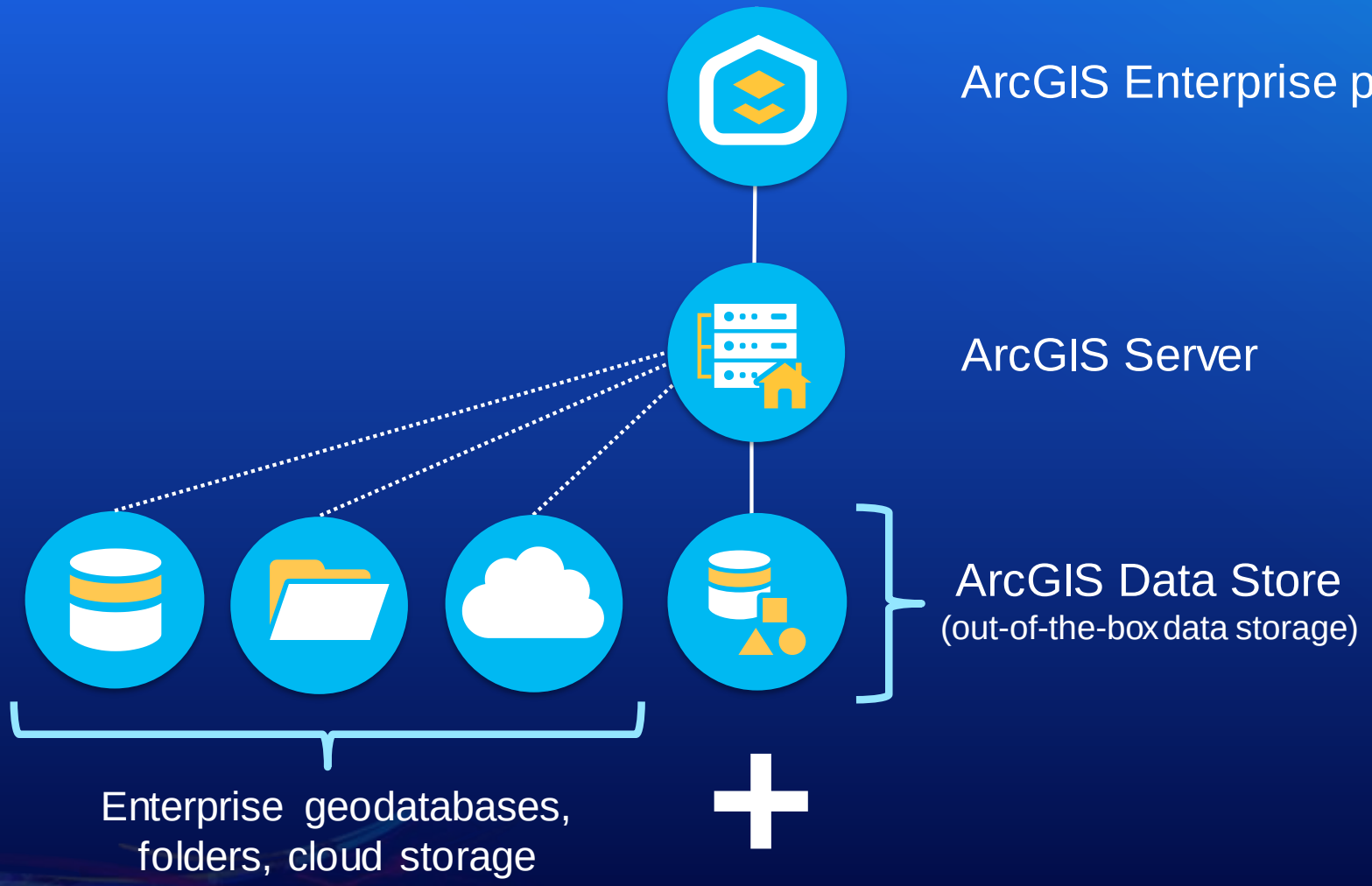


Web GIS you control
(ArcGIS Enterprise)

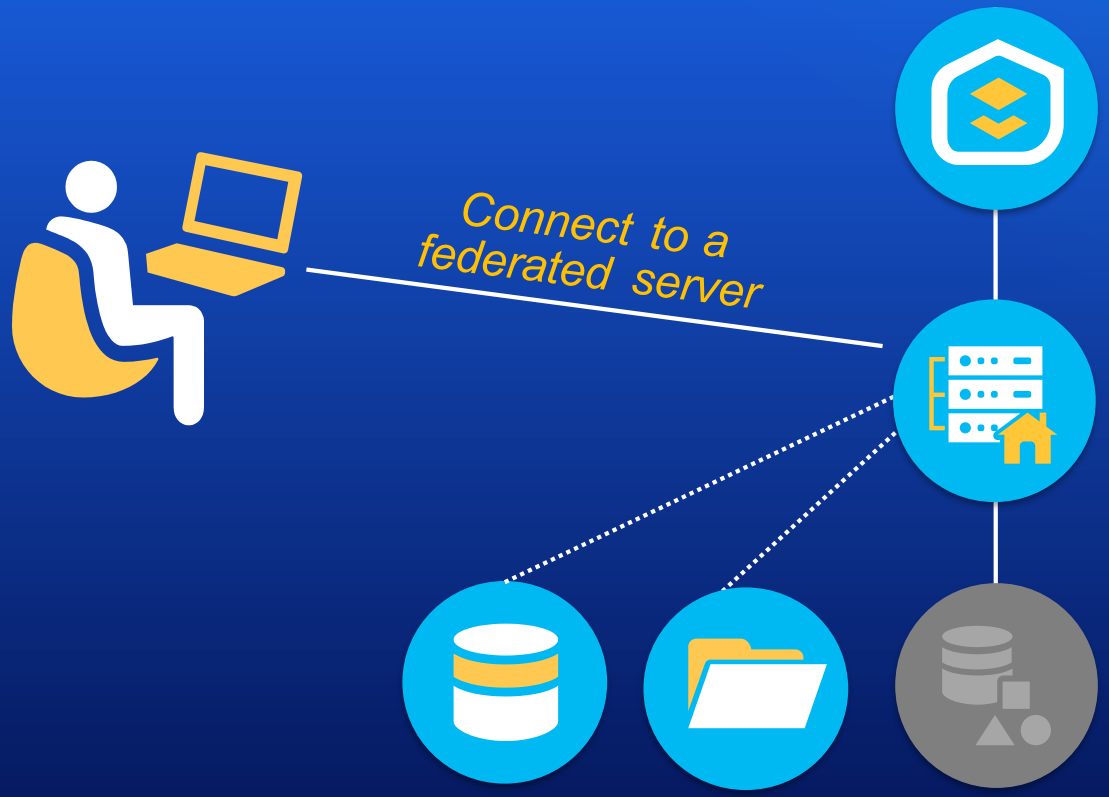
Single user
desktop workflows
(ArcGIS Desktop)

Multi-user
geodatabase workflows
(ArcSDE → DB-connects)

ArcGIS Enterprise basic architecture



Workflow:
Referencing YOUR data



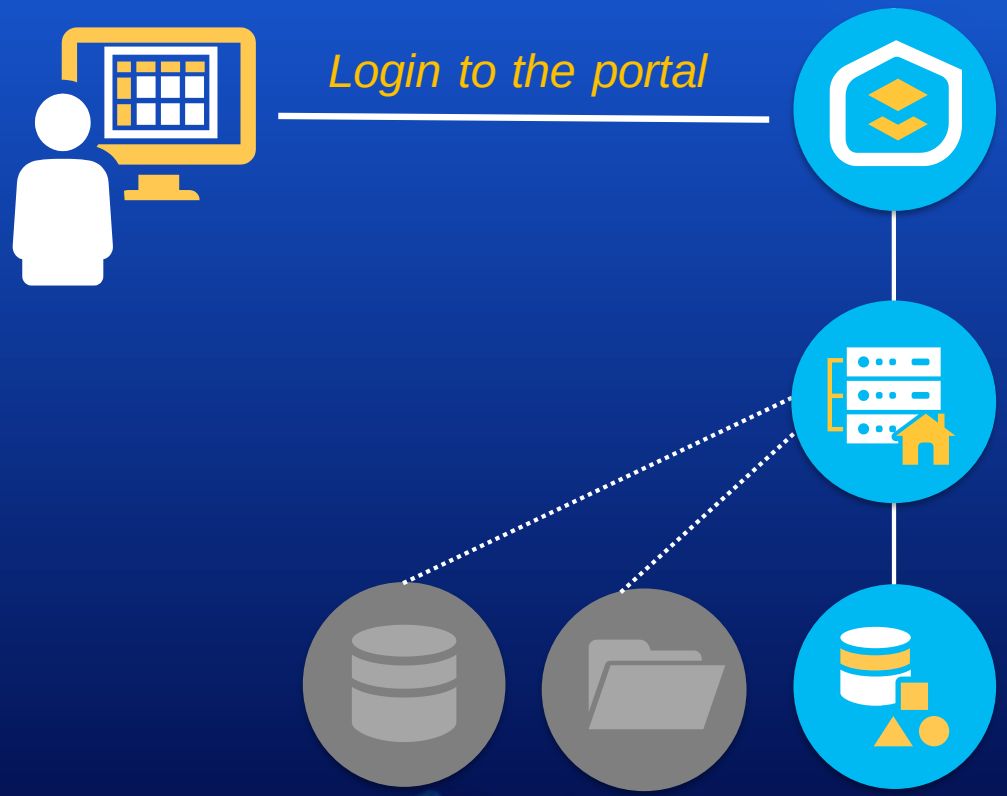
ArcGIS Enterprise portal
Feature layer (item) created

ArcGIS Server
Feature service created

ArcGIS Data Store

Enterprise geodatabases, folders
Data remains here

Workflow:
Self-service mapping

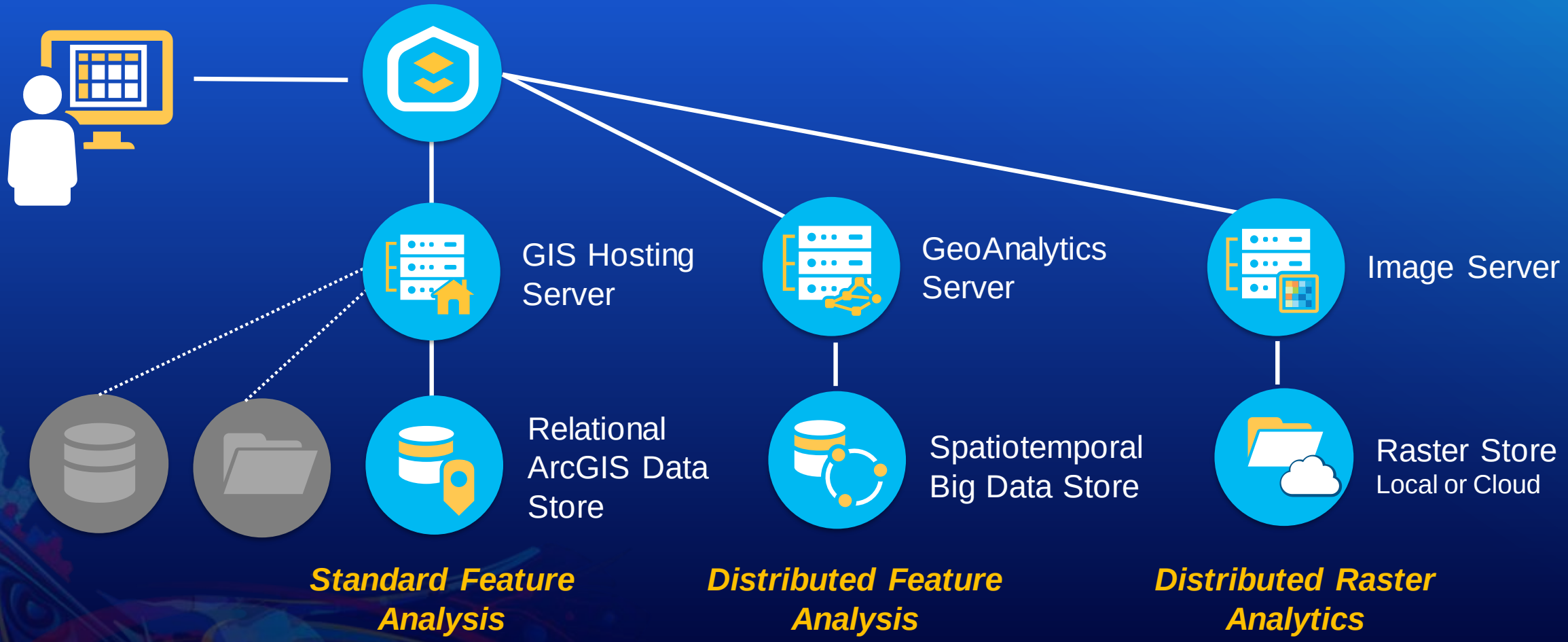


ArcGIS Enterprise portal
Feature layer (item) created

ArcGIS Server
Feature service created

ArcGIS Data Store
Data stored here

Workflow:
Enterprise Analysis



Enterprise Analysis

Different types of results

Key ArcGIS data options available today

Storage Type	Infrastructure	Typical Uses	Common Data format
 Files/Folders	• Local OS folders • Often on a network file share	• Local data for ArcGIS Pro • Registered data store • Project packages	• Shapefile, CSV, txt • File geodatabase • Raster/imagery
 Enterprise Geodatabase	• RDBMS • Often managed by IT/DBA • Can be large scale	• Multi-user editing (versioning) • Topology, attribute rules, etc. • Registered data store • Utility network, parcel mgmt	• Feature class • Mosaic dataset • Parcel fabric
 ArcGIS Data Store	• ArcGIS Enterprise component • Supported three types • Often on dedicate host	Hosted layers • Relational (feature) • Tile Cache (scene) • Spatiotemporal big data store (real-time)	• Accessed as layer item in the Enterprise portal
 Cloud Storage	• IaaS → AWS & Azure • DbaaS → Azure SQL database • Amazon → PostgreSQL RDS	• Imagery/raster store • Map & Image cache folders • ArcGIS Data Store backup	• Standard file data formats • Feature class/Query layer • CRF (cloud raster format) • Cache raster format
 Big Data Storage	• Hadoop • Hive	• Input to big data GeoAnalytics	• Shapefile, delimited text • ORC (optimized row col) • Parquet

How the data is managed…

User managed:

Data you manage and provide to ArcGIS

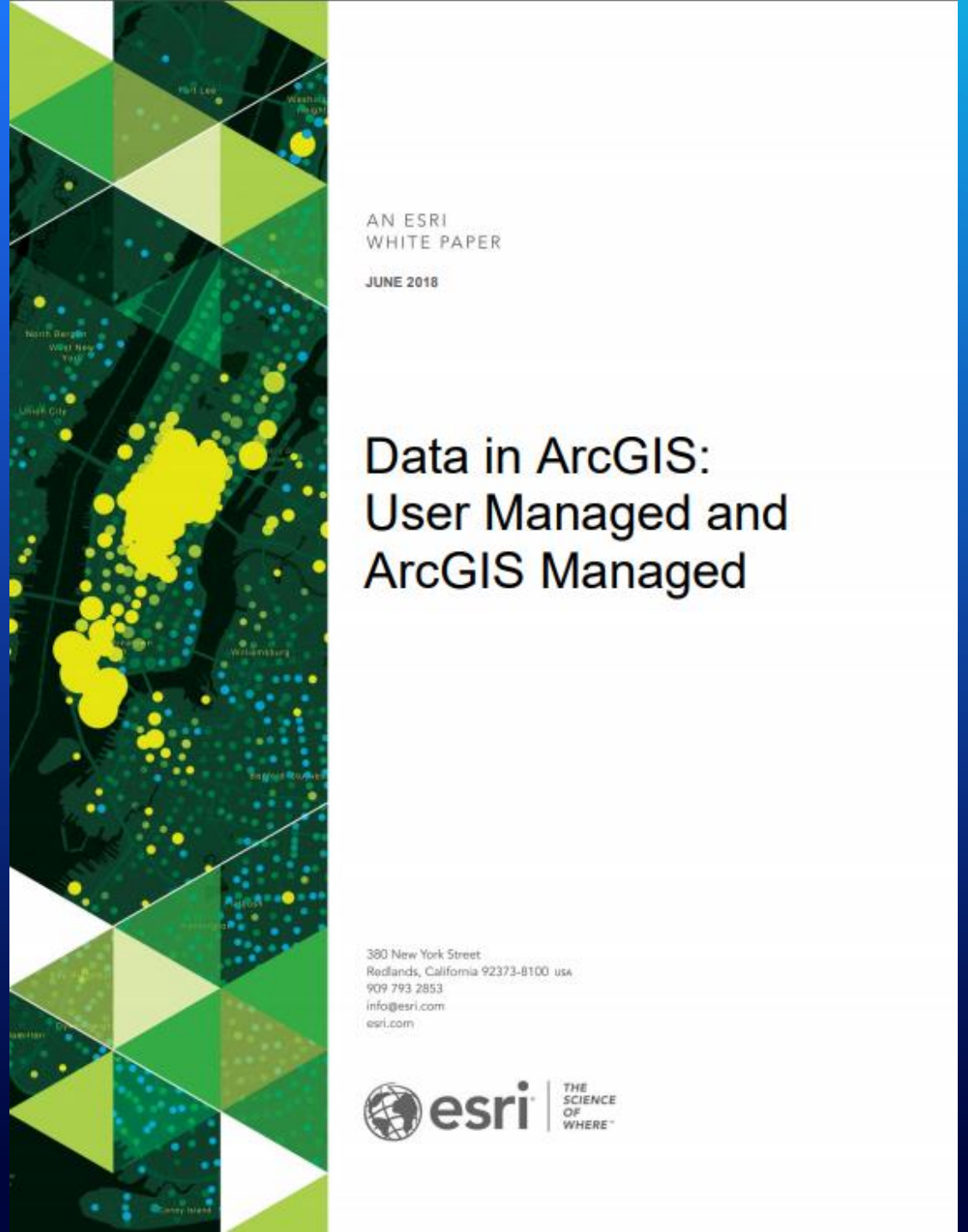
- Data storage managed by you
- You provision, scale, tune, delete the underlying database
- You make it accessible to ArcGIS Enterprise by registering it
- Publish through a server connection (e.g., via ArcGIS Pro)

ArcGIS managed:

Data created and managed by ArcGIS

- ArcGIS Data Store instances or Enterprise managed folders
- Installed and/or configured as SW
- Managed via application user interfaces, SDKs and/or APIs

Technical paper: Data in ArcGIS



AN ESRI
WHITE PAPER

JUNE 2018

Data in ArcGIS: User Managed and ArcGIS Managed

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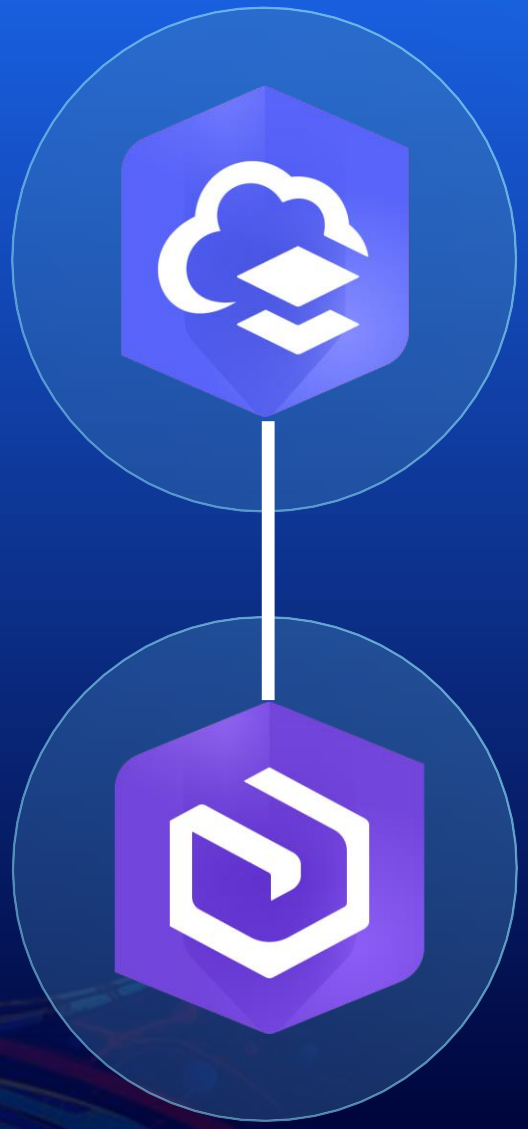
esri THE SCIENCE OF WHERE

Technical paper: Data in ArcGIS

	User managed (enterprise geodatabase)	ArcGIS managed (hosted data in the ArcGIS Data Store)
Database Technology	Option of RDBMS (Oracle, SQL Server, PostgreSQL, Informix, Db2, SAP HANA, etc.)	The database is chosen by ArcGIS; not a bring-your-own-database nor a general-purpose database.
User Access	Multiuser, with both direct connect from desktop applications and via REST-based map and feature services.	Multiuser, solely via REST-based map and feature services.
Rendering	Map services can render the output server-side using map image layers. Both map and feature services can render client-side via feature layers. Map image layers support advanced renderers and cartographic options not available in feature layers.	Hosted feature layers only support client-side rendering with out-of-the-box symbol set and cartographic options.
Versioning and archiving	Supports both traditional versioning and branch versioning. Archiving historical snapshots is supported.	Versioned editing is not supported; the last edit submitted is stored for the feature layer. No archiving.
Topology	Topology rules can be created and enforced.	Topology rules not supported.
Scalability	The underlying RDBMS can be scaled to support a large number of users, editors, and data using native RDBMS features and scaling of the server hosting the database. In pre-10.7 versions of ArcGIS Enterprise, individual map and feature services that reference user managed data sources can have a substantial memory footprint on the server. With the introduction of shared instances, this memory consumption can be substantially lessened and for this reason, generally should not be a determining factor in where to store your data.	The relational data store type of ArcGIS Data Store can be scaled vertically; adding more capacity & resources to a single machine. A secondary machine can be added as passive backup and a failover host. Individual hosted feature layers have very low memory footprint on the server. Hundreds to thousands of hosted feature layers can be supported on a standard configuration.
Use as managed	Not supported, however the geodatabase can be registered	Supported – only the relational ArcGIS Data Store

Complementary public and private web GIS



ArcGIS Online

- Hosted data only
- Public content and open data
- Non-employees (volunteers, contractors)
- Enhanced functionality
  - ArcGIS Tracker, Analytics Velocity
- Collaboration with ArcGIS Enterprise

ArcGIS Enterprise

- Registered data:
  - File data & Enterprise geodatabases
  - Continuous, multi-user datasets
- *Hosted data:*
  - Data for self-service mapping
  - Analysis results (feature & raster)
- Deploy onsite or in the cloud
- Collaboration with ArcGIS Online or Enterprise

Data strategy building blocks

Bringing it all together

The Why, How, What…

WHY
-Goal
-Audience

***HOW** will my data be….*
-Modeled
-Collected or captured
-Stored
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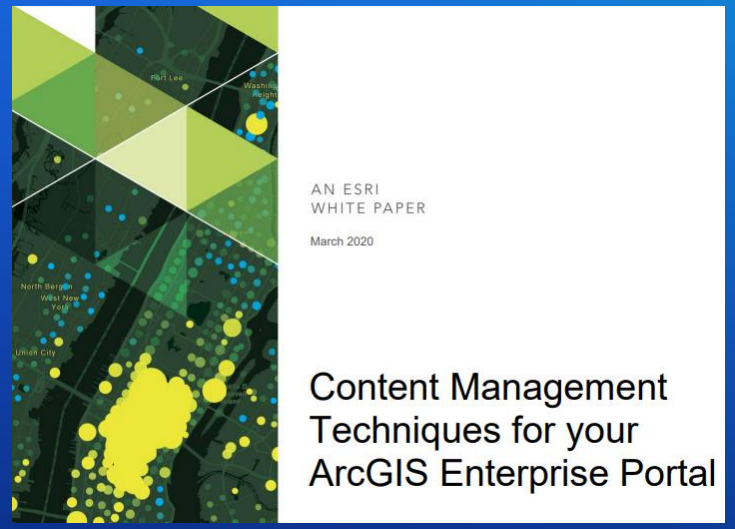
WHAT
-Software applications
-Tools
-Data
-Documentation
-Engineers

Building a data strategy form

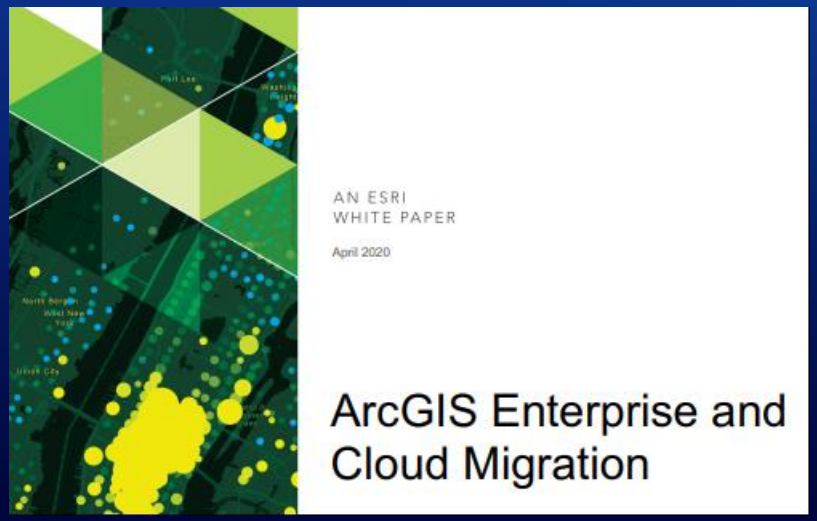
WHY	**Need that must be addressed**	Audience - Management
	Maintaining an accurate inventory of parcels in my city.	***Karen Albo**: Corporate, Data Manager* ***Billy Bones**: GIS Manager*
HOW	**Workflows** – data management	
	Editors will perform topological edits against a feature service *Editors will perform offline edits and sync when online* *Administrators will perform quality control on edits made* *Management dashboard to report parcel updates over 7 days*	
WHAT	**Resources** – software / tools / data / documentation	Human resource – IT, DBA, GIS Admin, etc
	ArcGIS Enterprise *Enterprise Geodatabase (Parcel fabric)* *ArcGIS Pro* *ArcGIS Collector* *Operations Dashboard*	***Maria Gomez**: Corporate, DBA* ***Josh Peabody**: Lead GIS Admin*

Additional Resources

- Technical paper - Content Management



- Technical paper – Cloud Migration



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