Designing and Using Cached Map Services

Tom Brenneman & Eric Rodenberg
What’s covered in this session

Agenda

Why cache maps?
Map cache best practices
Map cache administration
Caching in the cloud
Why Cache Maps
Understanding caching concepts
Why cache maps?
What should you cache?
How do you make a map cache?
Choosing image formats

• Let the ArcGIS Service Editor choose for you!
  • Vector only caches (few colors)
    • PNG (auto selects bit depth)
  • Vectors only caches (many colors)
    • PNG (auto selects bit depth)
  • Imagery
    • MIXED with 55 quality
  • Vectors or labels + Imagery
    • MIXED with 90 quality
Does Compression really make a difference?

- Large number of continuous colors
  - JPEG (start with quality = 55)
  - Mixed (if transparency required)

Which one looks better?
Does antialiasing make a difference?

- High quality line/label rendering on vector maps
- Web standard (Google, Bing, AGOL)
- Takes LONGER to cache
Map caching
best practices
Strategies and techniques
Understanding cache structure

Bundle
8 x 8 Supertiles

Supertile
16 x 16 tiles

Standard tile
256 x 256 pixels

16,384 tiles
Supertiles and Labeling

- ArcGIS Server Draws Large Areas
  - Reduces duplicate labels
- Duplication May Occur
  - Use Annotation or MapPlex Labels with Rules
  - Use Map Server Cache Tiling Scheme To Polygons
You don't need to generate everything

- Cache by feature
  - Polygon features
  - Generates all tiles for intersecting supertitles
- Saves on...
  - Generation time
  - Processor resource
  - Disk usage

NM highway case study: Build 20 of 64 Supertiles for the bundle shown
Handling tiles you do NOT create

- Create “No Data” tile
  - Same image format  (JPG or PNG)
  - Same size  (256 x 256)
  - Save in cache folder
    …\<dataframe>_alllayers

- How to
  - Knowledge base article 36939 has sample files
Build a test cache and note the following

- Creation time
- Appearance
- Client performance
- Cache size validation
Tracking cache status & fixing errors

- Status.gdb
- CacheStats
- JobDetails
- JobStatus
- TaskStatus

Cache Status - Streetmap

Summary: 49.1% of the tiles are present.
Status: The generation is not in progress.

Errors:
- Report Errors...
- Fix Errors
- Export Errors to File...
- Details...
Map cache administration
Generate and update techniques
Setting the Number of Instances

- Cache Tools Geoprocessing Service
  - Start with $N$
  - $N = \text{CPU's per server}$
  - See cloud session for Amazon recommendations
System caching services

- **System services**
  - Caching Tools: Sets caching instance per machine
  - Caching Controllers: Assign cache jobs to instances

- **Manage Map server Cache Tiles**
  - Controls instances per job
  - Set to -1 to use all instances
Update a cache using a staging server

**Staging ArcGIS Server Instance**
- Map service
- All layers for cartography of map service

**Production ArcGIS Server Instance**
- Map service
- Layers for TOC and Query

**Cache folder**
(On-demand caching needs the full map to build the cache)
Isolate caching to certain servers

- Organize GIS Servers into Clusters
  - Generate Cache on its own cluster
  - Scale or reconfigure while caching
Cache update automation

- Use Model Builder to script update automation
  - Rebuild Specific Tiles
  - Export to Python
  - Schedule Run Time

- Useful update tools
  - Compare feature classes
  - Show edits since reconcile

- See demo theater
  - Automating Cache Workflows and Building Tile Usage Heat Maps
Cache export & import tools

- Export tiles
  - Based on extent or polygon features
  - Convert storage format
  - Use for cache import or as a disconnected cache

Import from a previously exported map cache.
What is image service caching

- Fast access to images as a tiled service
  - Outperforms / scales mosaic dataset and raster dataset
  - Imagery is not processed on the fly
- Uses image extension
Why should I cache image services

- Improved performance for basic images
  - Can not modify mosaic methods
- Skip overview generation
  - Tiles generate from large scales to small scales
- Improve performance for slow formats
  - Recommended for highly compressed formats – e.g. JPEG2000, MrSID
- Caching image services is much faster than caching map services with imagery
  - Faster rendering engine for imagery
Caching in the Cloud
ArcGIS Online Map Caching
Caching in ArcGIS Online

- ArcGIS Online subscription allows for caching
- No need to worry about capacity
- Charged by tile creation and storage

Two approaches
- Upload data to AGOL
  - Build and store cache with AGOL
- Upload tile package to AGOL
  - Build cache on premises (ArcMap) but store with AGOL

Understanding credit usage:
http://www.esri.com/software/arcgis/arcgisonline/credits
Why create a tile package?

- Local cache for Desktop, Runtime and productivity applications (Collector)
- Transport a map cache
- Upload a map cache to ArcGIS Online
Creating a tile package

• ArcMap Options > Sharing > Enable ArcGIS Runtime tools
• Three options for creation
  - Create tile package within ArcMap
    - Single processor
    - File > Share As > Tile Package
  - Create Cache with ArcMap & Geoprocessing
    - Parallel Processing
    - Data Management > Tile Cache Toolset
      - Manage Tile Cache
      - Export Tile Cache
  - Create cache with ArcGIS Server
    - Tile Cache > Export Tile Cache
      - Uses Parallel Processing Factor Geoprocessing Environment setting
DEMO
ArcGIS Online Caching
Indiana State Fairgrounds Example Credit Usage

- ArcGIS Online Tile storage = 1.2 credits per 1 GB per month
  - 1 Credit is 10 cents or less
- This cache = 8.91 MB
- Credits per month
  - 8.91 MB / 1024 MB * 1.2 Credits
  - 0.01044 Credits * 10 = 0.1044 Cents
- 0.1044 cents per month * 12 months = 1.25 cents per year

... In 20 years this cache will cost a quarter
It’s QUIZ TIME!

- Open a browser and navigate to http://kahoot.it

Or scan this if it is easier
Thank you…

- Please fill out the session survey in your mobile app
- Select “Designing and Using Cached Map Services” in the Mobile App
  - Use the Search Feature to quickly find this title
- Click “Technical Workshop Survey”
- Answer a few short questions and enter any comments
Want to learn more?

- **Documentation**
  - Creating a cached map service
  - Creating a map cache (Help)

- **Related Esri Training and Tutorials**
  - Building and Updating Map Caches with ArcGIS Server
  - Sharing Cached Imagery in ArcGIS

- **Related Sessions**
  - Road Ahead for Vector Mapping (vector tiling)
    - Room 3 Thursday 7/23 3:15 PM – 4:30 PM
Designing and Using Cached Map Services

Understanding our world.