

Managing the National Flood Hazard Layer with FME



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- Michael Baker Jr., Inc (Baker)
 - Engineering and environmental focused
 - Corporate headquarters - Pittsburgh, PA
 - Approximately 55 offices spread over 30 states
 - 250+ GIS professionals
 - Analysts, DBAs, Developers, and Managers
 - DFIRM Tools team – Alexandria, VA
 - 10-15 people - Analysts, DBAs, Developers, and Managers

- FEMA's National Flood Insurance Program (NFIP)
 - Focused on reducing financial and physical impact of community based flood disasters
- Map Modernization (Map Mod) Program
 - Transition from paper maps to digital data availability
 - Increase data accessibility and standardization
 - Reduce costs for production and storage
 - Promote local administration of the National Flood Insurance Program (NFIP)



Photo from USACE Digital Visual Library (Sacramento District)

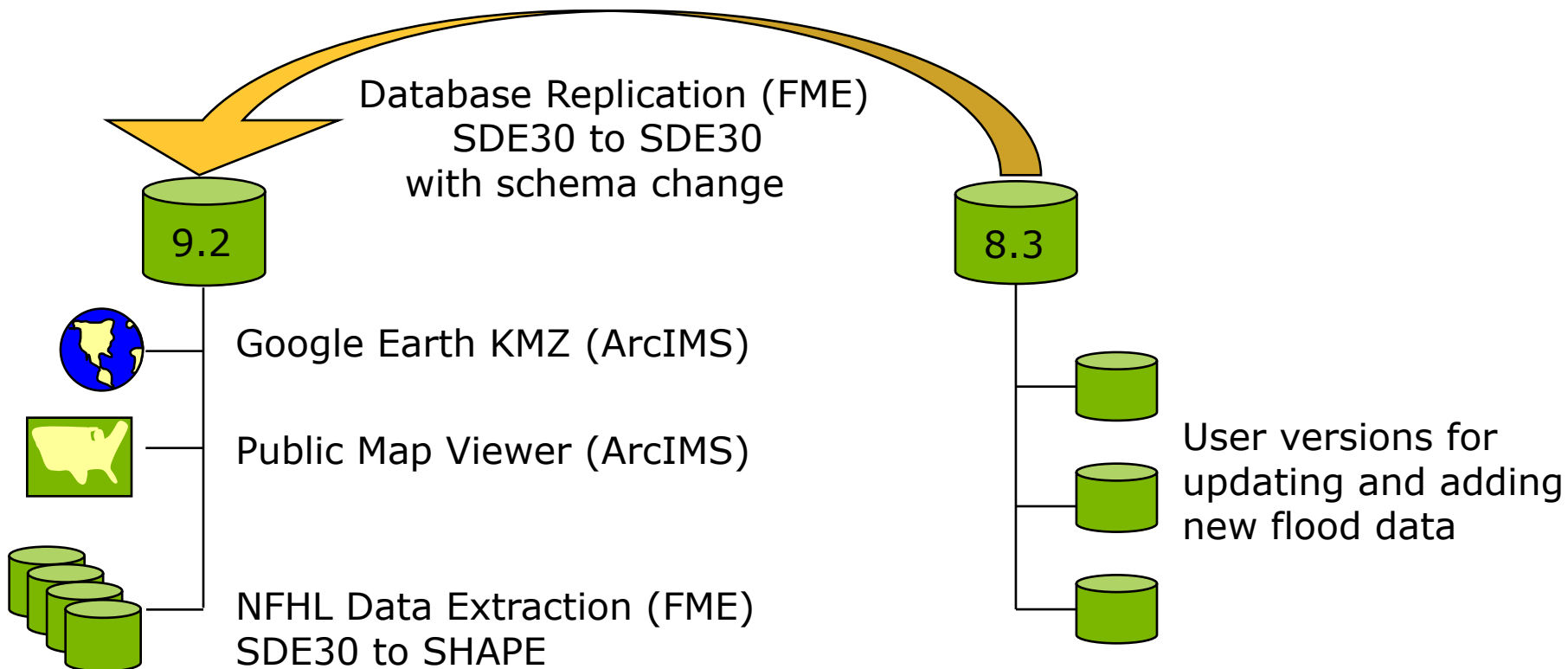
- One major goal of Map Mod was to create a contiguous layer of FEMA flood data
 - National Flood Hazard Layer (NFHL)
 - Baker, as the National Service Provider (NSP), tasked with development and maintenance
 - Baker created suite of GIS tools to aid in the creation of the flood data and Digital Flood Insurance Rate Maps (DFIRMs)
 - Ongoing effort as flood data is developed digitally, goes effective, and is revised

- Managing data in separate databases
- Public viewer was not kept up to date
- Real time data extraction not available to FEMA stakeholders

- Two primary databases that store the NFHL
 - Production database
 - Ongoing revisions and additions being incorporated by users of DFIRM Tools
 - ArcSDE 8.3, Oracle 9i
 - Accessed by ArcGIS 8.3 custom Tools
 - MapViewer database
 - Available to public users for viewing flood data, making custom maps, and extracting data for distribution
 - ArcSDE 9.2, Oracle 10g
 - Accessed by ArcIMS 9.2 and published KMZ

Integrating FME with the NFHL

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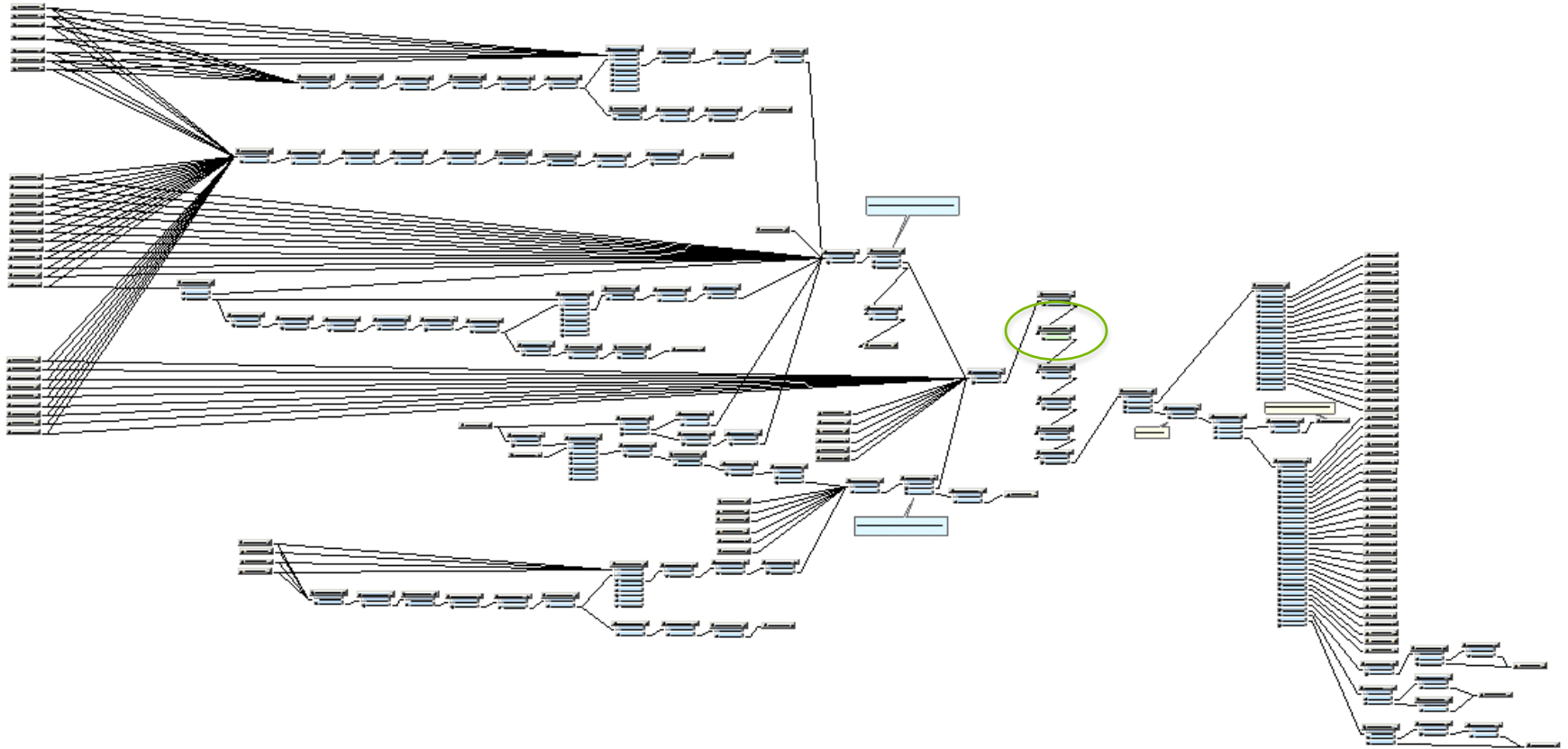


- Key tasks with FME
 - Schema changes
 - Submitted data must be converted to a custom Production schema for use in SDE Production database
 - Data must be converted back to Final schema for proper display and functionality in MapViewer database applications
 - Data must be distributed in Final schema for public and stakeholder use
 - Identify invalid geometries in SDE Production database
 - These features will not load to the target database and will cause the workspace to fail
 - Trapping these features allows us to continuously monitor the data integrity of the source and clean up erroneous features
 - Creating workspaces for reporting
 - Low level statistics are generated with the extracts

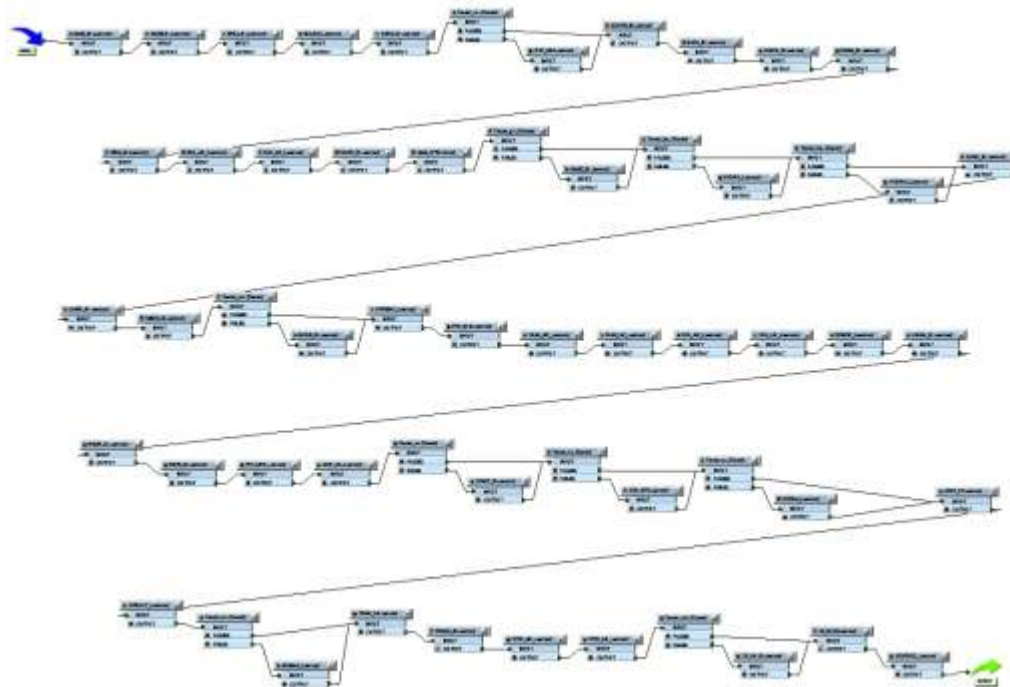
- Prepping NFHL data with FME
 - Shapefiles received are converted to production schema and loaded to 8.3 production database
 - Previous process has been cut from hours (up to 6) to minutes (nothing longer than 5 thus far)
 - Primary Workspace:

Primary Workspace

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- Prepping NFHL data with FME
 - Custom transformers
 - Repetitive process for each input layer moved to a custom transformer



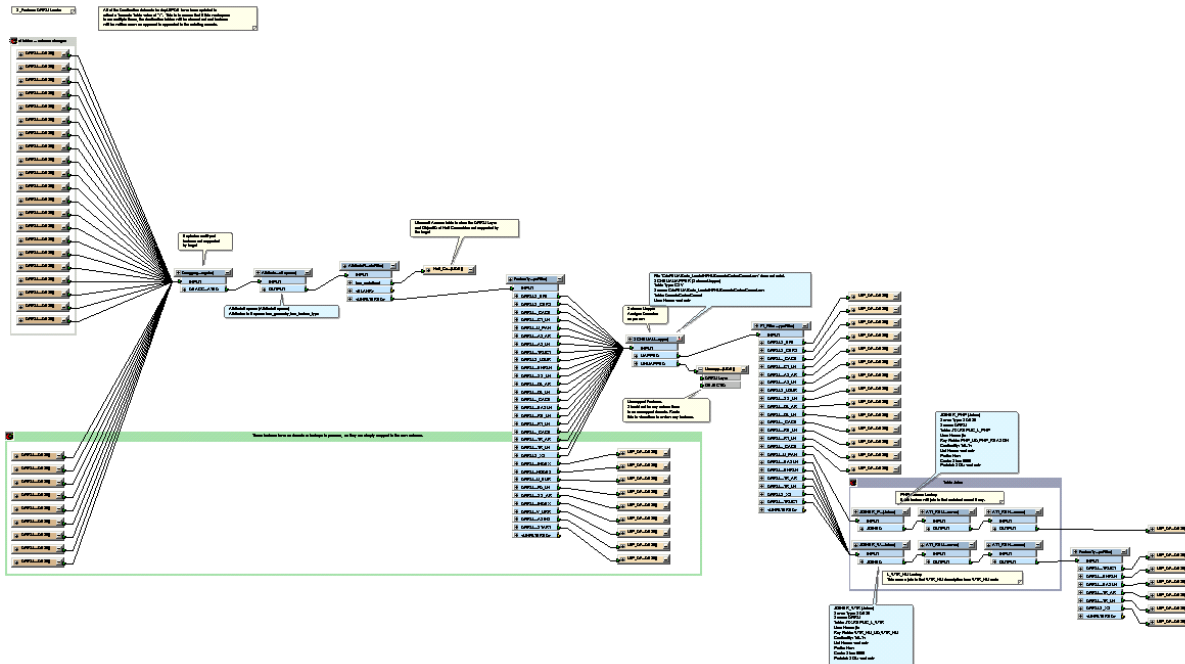
- Replicating Production Database to MapViewer
 - Initial load to move all data from Production to MapViewer
 - Workspace copied 9 million features from one database to another through a batch file that passed the Feature Types to Read parameter for individual layers in the source database
 - Layers that took extensive processing time were further filtered by ranges of ObjectIDs (“Where” parameter)
 - After initial load, two databases are kept in sync with an Update workspace that replaces DFIRM Studies in the target with updated representations in the Source
 - ArcSDEQuerier transformers perform the data deletion from the target and data retrieval from the source
 - A User table is the only input and is populated manually based on the studies being updated

Replicating to MapViewer

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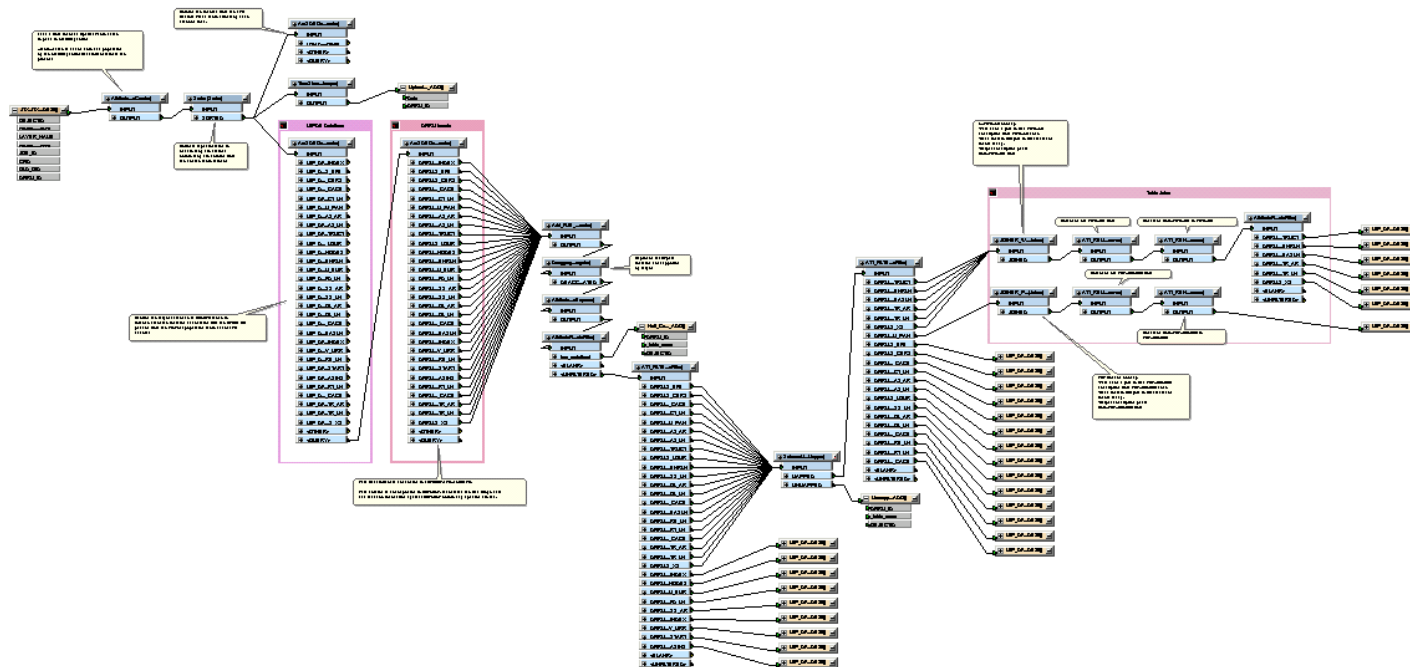


- Replicating Production Database to MapViewer
 - Load Workspace:



Replicating to MapViewer

- Replicating Production Database to MapViewer
 - Update Workspace



- Table Joins with versioned tables not supported
 - Copy the versioned tables to unversioned tables prior to each workspace run
- Tracking Deltas between databases
 - Mechanism for identifying and monitoring feature level edits was not available
 - All features in Production are associated with County-level datasets which are removed and replaced with the Update
- Processing time
 - Initial testing of Load workspace took 64 hours
 - Executed in Development environment
 - Final Load of data took 40 hours after database enhancements
 - Executed in Production environment

- Increased efficiency for data prep, load, and transfer
- Useful reporting tool when generating statistics against Databases
- Current functionalities are being revisited for possible enhancements
- Generated interest for other Baker projects to use for data transfer and raster processing

- Evaluate newly discovered transformers to possibly take the place of current functionality
 - Workspace runner vs including small workspaces in a BAT file
- More efficient workspace building due to better understanding of FME functionality
 - Better at troubleshooting workspace failures
 - Better ability at QCing data as it moves through the translation
- Development of QC checks for Baker's in-house flood data development

Thank You!

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- Questions?
- For more information
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