RESTFUL REQUESTS FOR DYNAMIC OGC SERVICES

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SUMMER ESIP FEDERATION MEETING, SANTA BARBARA, CALIFORNIA
JULY 7-10, 2009

UNM

BACKGROUND

- EDAC manages the New Mexico Geographic Information System (RGIS) - the geospatial data clearinghouse for the state of New Mexico
- The last major version of RGIS was written in 2000-2001 as a browsable listing of available data products that could be downloaded via HTTP
- RGIS Data holdings grew slowly From 2001-2005. More rapidly between 2006 and 2009

BACKGROUND

- Most recent RGIS growth can be attributed to large imagery collections collected over areas ranging from large regions (Middle Rio Grande), to statewide
- These collections have proven to be both high-demand, large, fragmented (i.e. a single statewide imagery collection may include over 8,500 separate image files).

RGIS 2.0

- In 2009 EDAC has committed to roll out a complete re-write of RGIS that reflects current models for geospatial data clearinghouses
  - Robust spatial and metadata-based searching
  - Live previews of selected data products
  - Online mapping
  - Ubiquitous geospatial services for direct use by client applications
  - Modern internet application "feel" (i.e. Web 2.0)

PROBLEM

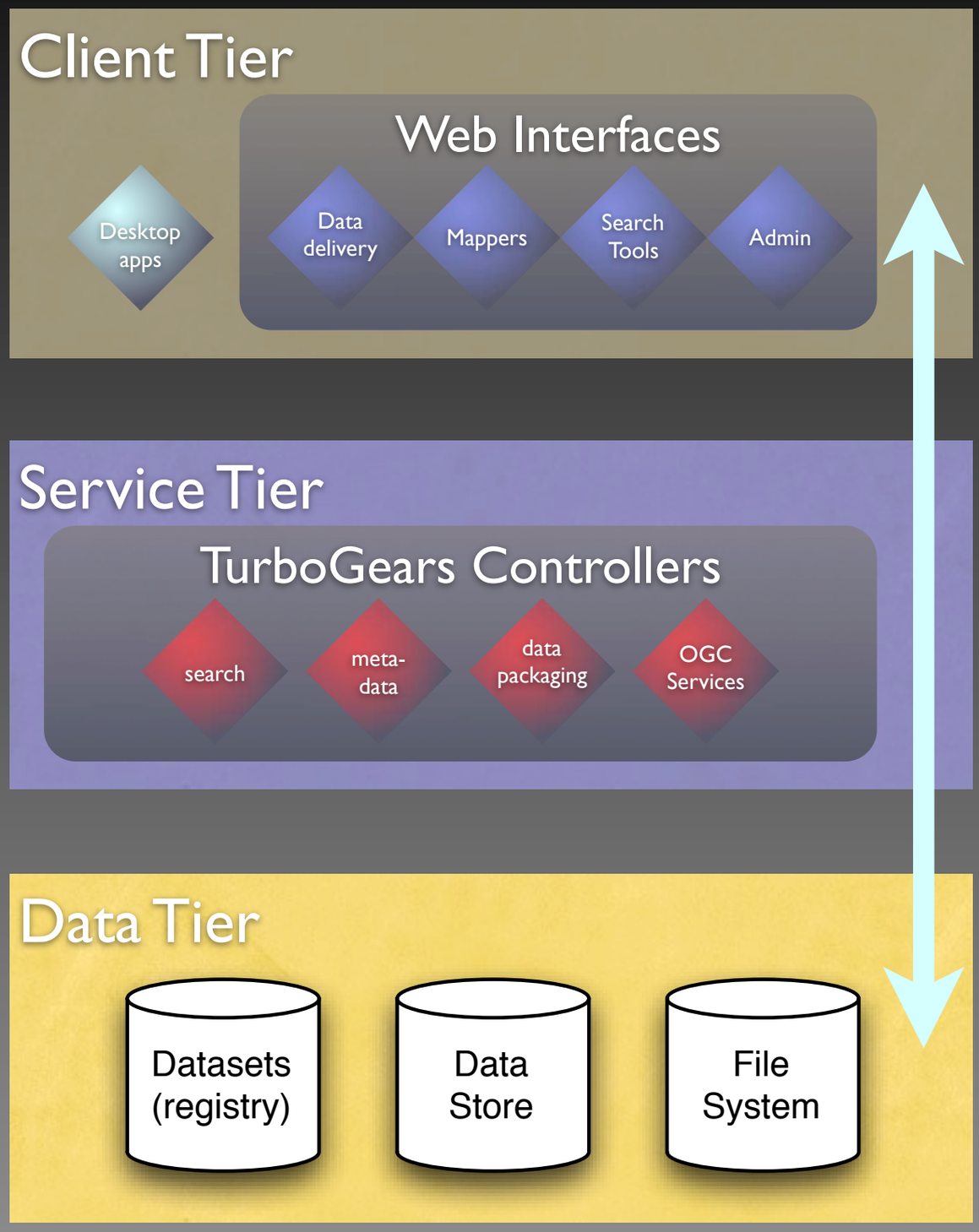
- Develop and architecture that is flexible and scalable with continued growth of users and content

➡ Decision to develop a consistent REST model for the entire system that provides a uniform API for all system interactions - including the OGC services hosted for clearinghouse products.

➡ Develop dynamic OGC services that are generated on demand for clearinghouse data, both as individual data products and as bundles (collections)

ARCHITECTURE

- 3-tiered Services Oriented Architecture
- Client Tier - data management and databases
- Service Tier - TurboGears (python) controllers
- Client Tier - custom web interfaces and general desktop clients



GENERAL REQUEST MODEL

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http://rgis.unm.edu:8888/

- Hostname

GENERAL REQUEST MODEL

http://rgis.unm.edu:8888/dataset/

- Hostname
- Controller

GENERAL REQUEST MODEL

http://rgis.unm.edu:8888/dataset/ogc/wms/24000/

- Hostname
- Controller
- Resource Specification

GENERAL REQUEST MODEL

http://rgis.unm.edu:8888/dataset/ogc/wms/24000/? ...

- Hostname
- Controller
- Resource Specification
- Additional Parameters (e.g. OGC, Format)

GENERAL REQUEST MODEL

http://rgis.unm.edu:8888/dataset/ogc/wms/24000/? ...

- Hostname
- Controller
- Resource Specification
- Additional Parameters (e.g. OGC, Format)
- Standard REST Request Semantics
  - GET = read object state
  - PUT/POST = create new object (planned)
  - UPDATE = modify existing object (planned)
  - DELETE = delete existing object (planned)

RESTFUL OGC SERVICES

- Services are generated on the fly using Python MapScript as a module within a TurboGears controller
- Specific layer(s) are defined by a numeric ID for either a single dataset or bundle. Bundles represent persistent collections of datasets
- All geospatial datasets in RGIS will ultimately have corresponding auto-generated OGC services
  - Vector Datasets - WMS, WFS
  - Raster Datasets - WMS, (WCS coming soon)

TRANSPARENCY OF REST MODEL

- Auto-generated OGC services are invisible to client applications
  - ID number in request URL corresponds with dataset or collection with standard layer names (i.e. corresponding with OGC layer naming requirements) in service
  - Standard OGC request parameters fully supported through parameter pass-through to MapServer binary from python MapScript
  - For example: OpenLayers (MapFish) mapping client access WMS services for client interface

SAMPLE REQUESTS (DATASET)

- Specific Raster Dataset (24000)
  - Mapping Interface - http://rgis.unm.edu:8888/mapper/dataset/24000
  - WMS GetCapabilities - http://rgis.unm.edu:8888/dataset/ogc/wms/24000/?VERSION=1.1.1&SERVICE=WMS&REQUEST=GetCapabilities
  - Download request - http://rgis.unm.edu:8888/dataset/download/24000?format=ecw

SAMPLE REQUESTS (BUNDLE)

- Specific Bundle (86)
  - Mapping Interface - http://rgis.unm.edu:8888/mapper/bundle/86
  - WMS GetCapabilities - http://rgis.unm.edu:8888/bundle/ogc/wms/86/?VERSION=1.1.1&SERVICE=WMS&REQUEST=GetCapabilities
  - WFS GetCapabilities - http://rgis.unm.edu:8888/bundle/ogc/wfs/86/?VERSION=1.0.0&SERVICE=WFS&REQUEST=GetCapabilities

OTHER INTERESTING REQUESTS

- Download vector dataset - http://rgis.unm.edu:8888/dataset/download/1/?format=shp (format can equal any of: shp,kml,xls,csv,gml)
- View metadata - http://rgis.unm.edu:8888/dataset/metadata/1
- Individual feature query (pokey) - http://rgis.unm.edu:8888/shape/index/1?lon=347985.29296462 34&lat=3935286.370482194&tolerance=6037.319047619 0475&epsg=26913
- Feature collection GeoJSON request - http://rgis.unm.edu:8888/shape/index/1
  - {"totalRecords": "1", "type": "FeatureCollection", "features": [{"geometry": {"type": "Point", "coordinates": [398150.31831962703, 3809432.6235177298]}, "type": "Feature", "properties": {"mtfcc00": "G4000", "statefp00": "35", "lsad00": "00", "name00": "New Mexico", "ur00": "M", "funcstat00": "A", "stusps00": "NM"}}]}

CONCLUSIONS

- Though we are still in the early stages of our development effort, we anticipate significant benefits
  - Strong separation between client and supporting services - allowing for development of new client interfaces (i.e. skinning for other projects/applications) without major retooling of services
  - Automatic generation of OGC services eliminates expensive management and delays in deployment of services for new data collections
  - REST model coupled with OGC service interfaces provide very flexible deployment options.

ACKNOWLEDGEMENTS

- RGIS is supported through funds from the New Mexico Legislature
- The New Mexico NSF EPSCoR program has contributed to this work through development funding in support of their upcoming data portal