



# MapServer/MapScript: The Web and Beyond

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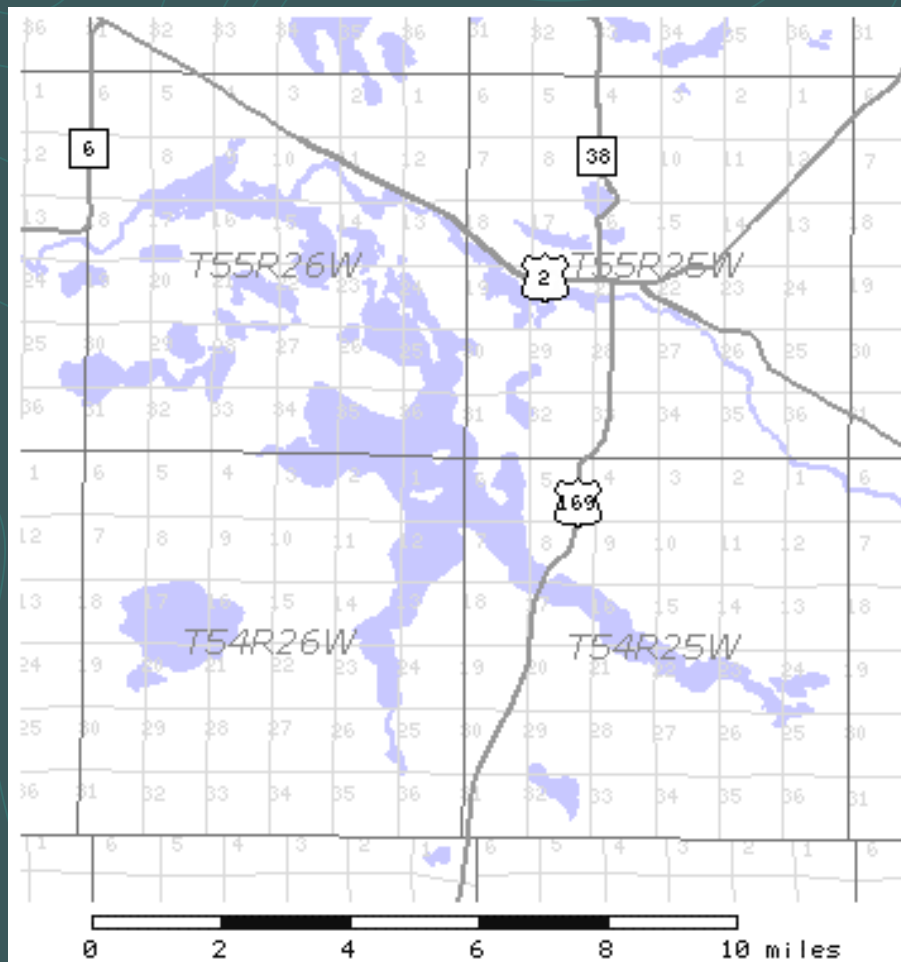
Minnesota DNR Forestry Resource  
Assessment MapServer Applications  
on and off the Web



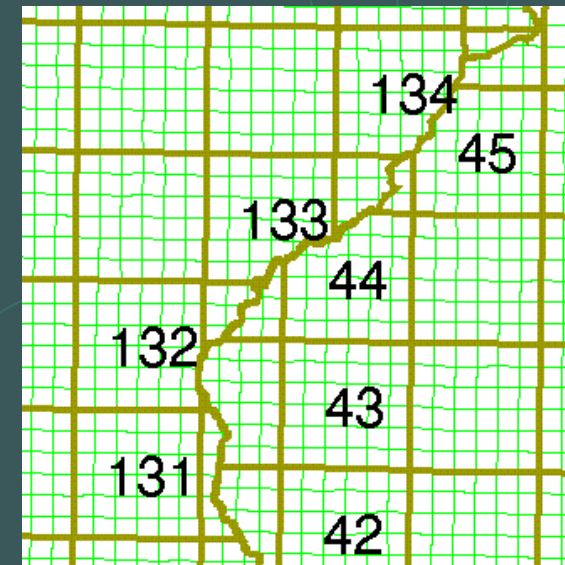
# Fire Reporting System

- A java/jsp distributed data entry system written to replace aging COBOL system
- Fire locations recorded using PLS descriptors
- MapScript is used to:
  - Convert PLS descriptors to UTM coordinates
  - Perform validation checks on locational data
    - Does the administrative area entered by the user match the administrative area returned by MapScript?

# Public Land Survey (PLS) Background



- Standard US cadastral system
- Townships consisting of 36 one square mile sections
- Each section subdivided into 16 forty-acre parcels, or “forties”




# Data Entry Screen

Minnesota DNR Fire Reporting System - Microsoft Internet Explorer


File Edit View Favorites Tools Help

Address <http://www.dnr.state.mn.us/fire-reporting/login.do> Go


fire!

*Fire Reporting System*

MINNESOTA DEPARTMENT OF NATURAL RESOURCES



[User's Manual](#)  
(PDF - 750KB)

**Select Ran**

111

[List Fires](#)

[New Fire](#)

[Status Report](#)

[Situation Report](#)

[List Aircraft](#)

[New Aircraft](#)

[Aircraft Synopsis](#)

**1. RAN**

111

**2. Fire No.**

57

**3. Time/Size**

*mm/dd/yyyy hhmm*

Est. Start

Reported  *Acreage*

*nonforest / forest*

Initial Attack   /

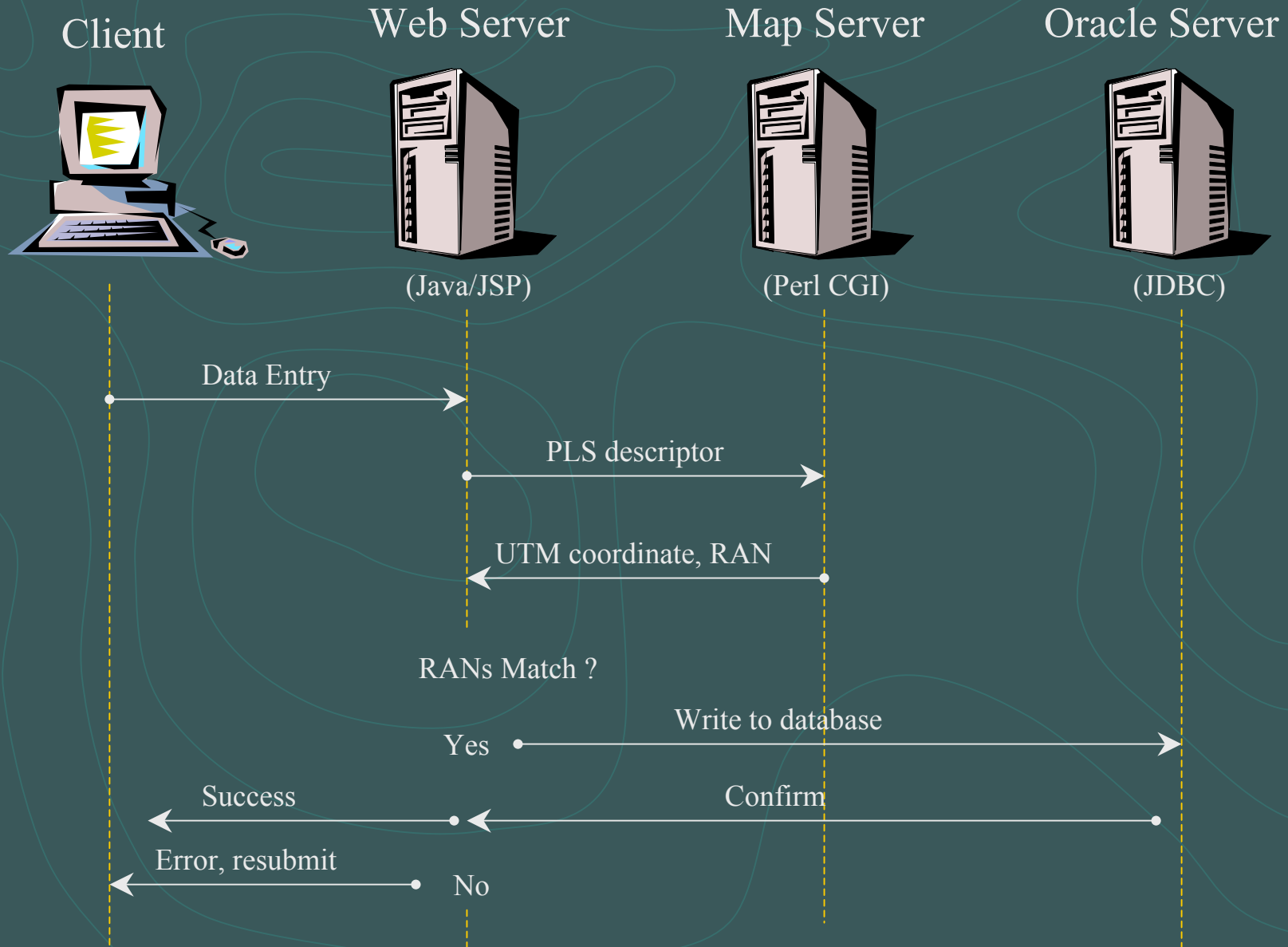
Controlled   /

Out   /

**4. Location of Origin**

County	Section	Township	Range	Forty
<input type="text" value="Beltrami"/>	<input type="text" value="14"/>	<input type="text" value="146"/>	<input type="text" value="32"/> <input type="text" value="W"/>	<input type="text" value="SWSE"/>

# Data Processing Flow



# PLS-to-UTM Conversion

- Location is specified to the PLS forty level
- 1.3 million PLS forties in MN
- Use staged query:
  - Lookup township attribute in township layer
  - Set map extent to resultcache bounds from previous query
  - Lookup section attribute in section layer
  - Set map extent to resultcache bounds from previous query
  - Lookup forty attribute in forty layer
  - Retrieve forty shape, nominal center  
(`$shape->getLabelPoint($point)`) is our UTM coordinate

# Locational Validation

- UTM coordinate for fire has been determined
- Simple queryByPoint against administrative layer tells us what administrative unit (RAN) that coordinate belongs to
- Return coordinate and RAN data to web server
- Check that returned RAN matches user-entered RAN.
  - Yes, write to database
  - No, return error to user and request resubmission

# Setting up MapScript Queries

```
$map = new mapscript::mapObj(undef);  
$queryLayer = new mapscript::layerObj($map);  
$queryLayer->{data} = $shpToQuery;  
$queryLayer->{status} = $mapscript::MS_ON;  
$queryLayer->{template} = 'dummy';  
$qclass = new mapscript::classObj($queryLayer);  
$rv = $queryLayer->queryByPoint  
    ($map,$point,$mapscript::MS_SINGLE,0);  
$rv == $mapscript::MS_SUCCESS or warn "Unsuccessful  
    queryByPoint" and return;
```



# MapScript as a Spatial Data Processing Tool

- If you have a favorite scripting language that MapScript supports, you can leverage it for (lightweight) spatial data processing tasks
- Save your expensive proprietary software packages for where you really need them
- Avoid limitations of proprietary Archaic Macro Languages
- Integrate with other available scripting environment libraries (eg. Xbase in Perl)

# Orthorectification Setup

Aiming for production processing of 4-5,000 photos annually, or 60-70 “blocks”.

In order to orthorectify a block of photography, we need:

- A shapefile showing estimated photo boundaries
- A shapefile showing estimated photo effective areas
- Digital scans of the relevant photos
- A textfile with “exterior orientation” parameters
- A mosaic of DOQ images for the area of interest

all stored according to a predefined directory structure and file naming system.

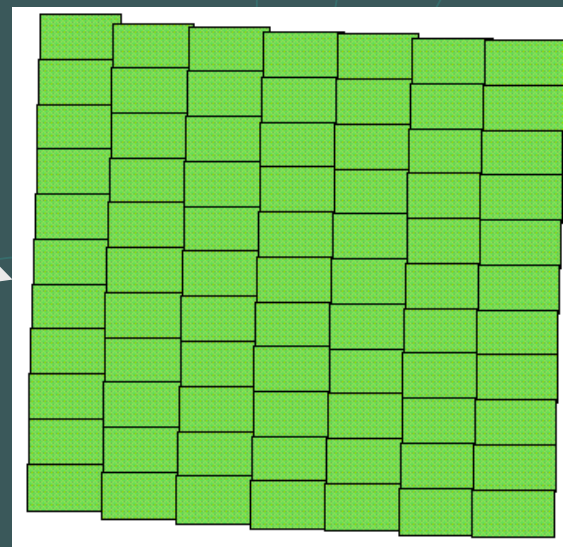
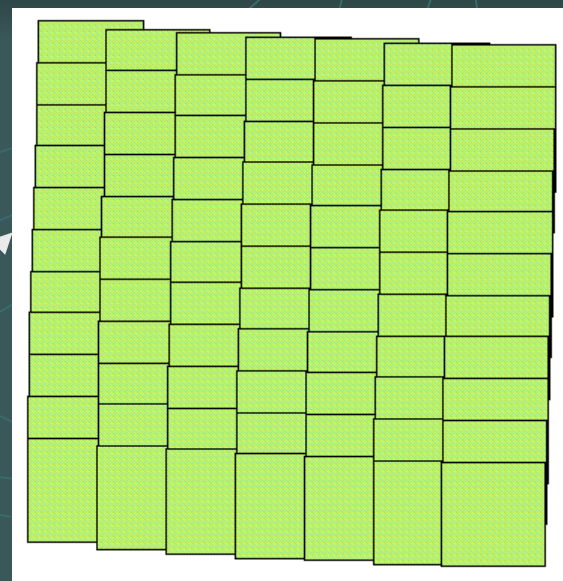
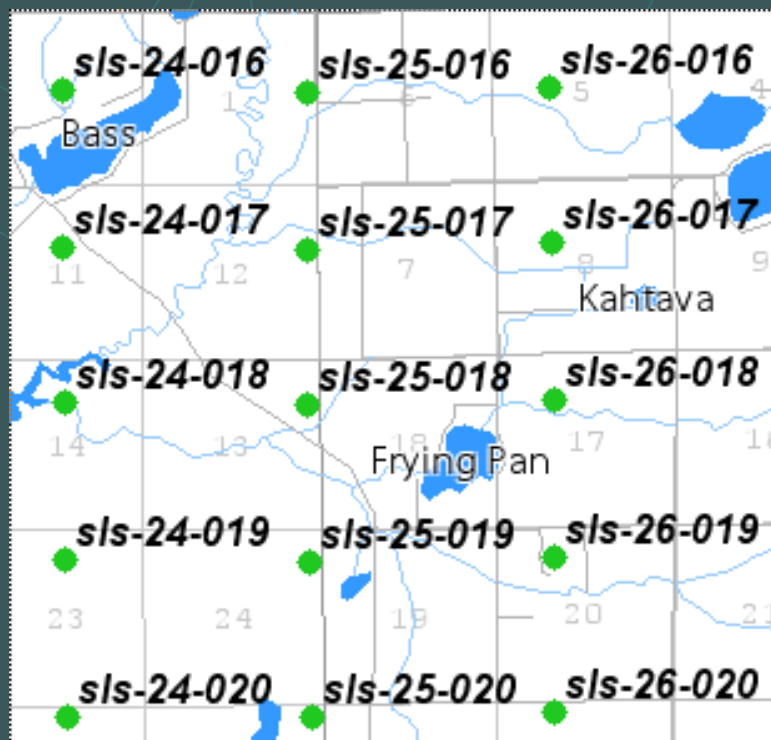
# Given:

- A digital flightline index (shapefile) with:
  - an ID attribute matching photo filenames
  - a block attribute identifying which block each photo belongs to
- A spatial index to the DOQs
- The scale and format (eg., 9x9 inch) of the photography
- A well-structured photo scan and DOQ library

Then we can...

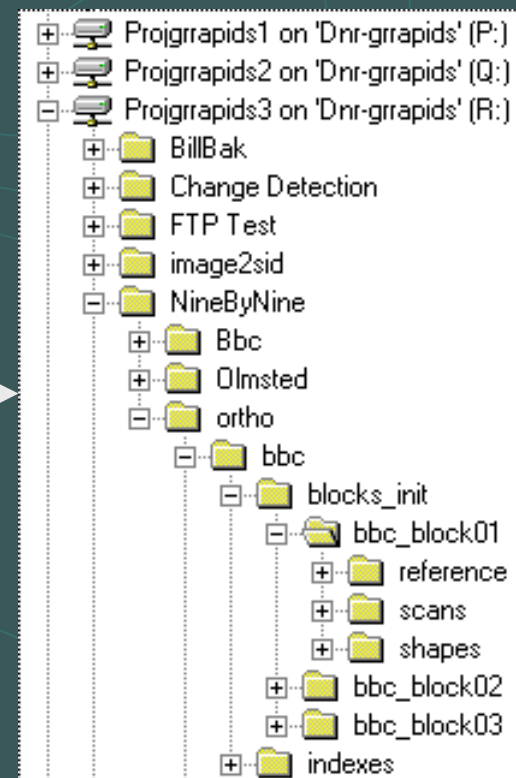
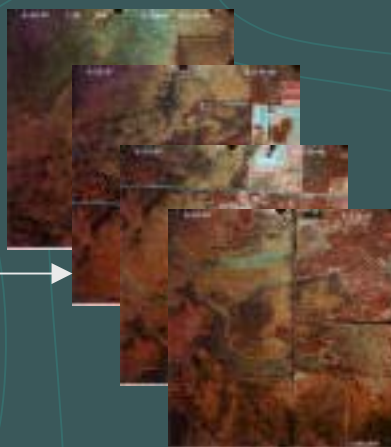
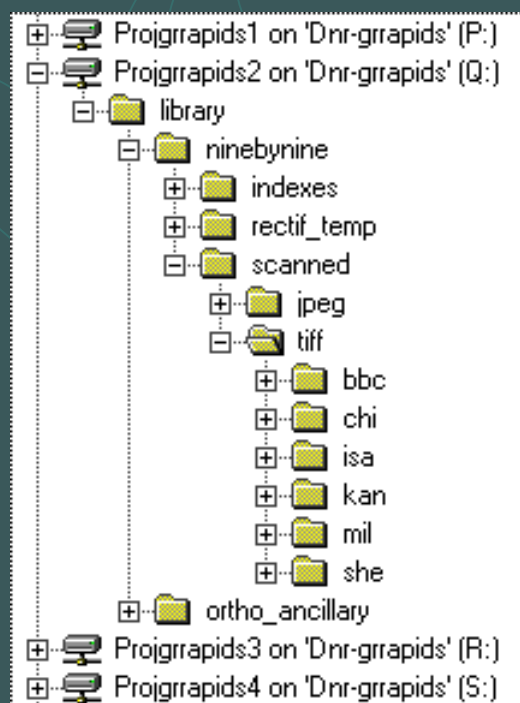
# MapScript It!

Convert photo centroids to boundaries



# MapScript It!

Retrieve appropriate photo scans



# MapScript It!

Dump required attributes to ASCII text

ArcView GIS 3.2a interface showing a map of a grid and an attribute table. The attribute table is titled "Attributes of Bbc\_block01\_est\_pbnds.shp".

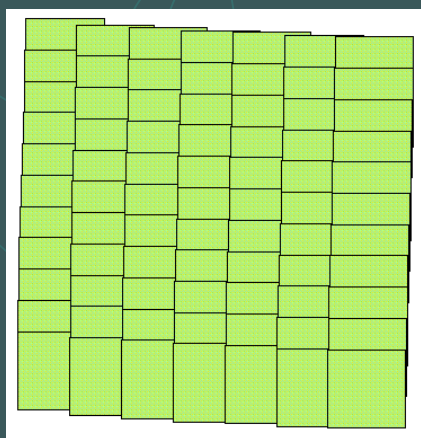
Shape	Project	File	Exp	Time	Date	Camera	Contractor	Alt	Label
Polygon	bbc	06	006	19:59:51	20010925	2691560	GRW	9226	bbc-06-00
Polygon	bbc	06	007	19:59:35	20010925	2691560	GRW	9225	bbc-06-00
Polygon	bbc	06	008	19:59:19	20010925	2691560	GRW	9224	bbc-06-00
Polygon	bbc	06	009	19:59:04	20010925	2691560	GRW	9226	bbc-06-00
Polygon	bbc	06	010	19:58:48	20010925	2691560	GRW	9241	bbc-06-01
Polygon	bbc	06	011	19:58:32	20010925	2691560	GRW	9236	bbc-06-01
Polygon	bbc	07	001	18:08:19	20010927	145851	GRW	9330	bbc-07-00
Polygon	bbc	07	002	18:08:35	20010927	145851	GRW	9362	bbc-07-00
Polygon	bbc	07	003	18:08:50	20010927	145851	GRW	9366	bbc-07-00
Polygon	bbc	07	004	18:09:05	20010927	145851	GRW	9349	bbc-07-00
Polygon	bbc	07	005	18:09:20	20010927	145851	GRW	9343	bbc-07-00

```

emacs@FORW085H801
File Edit Options Buffers Tools Help
1, d:/ortho/bbc/bbc_block01/scans/bbc05001.tif, 268687.256283946, 5267337.2379172, 9151, 0, 0, 0
2, d:/ortho/bbc/bbc_block01/scans/bbc05002.tif, 268629.440134215, 5265884.2126103, 9189, 0, 0, 0
3, d:/ortho/bbc/bbc_block01/scans/bbc05003.tif, 268594.200923834, 5264425.73368001, 9196, 0, 0, 0
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44, d:/ortho/bbc/bbc_block01/scans/bbc08011.tif, 275496.313106967, 5252270.10944388, 9399, 0, 0, 0
--(Unix)-- bbc_block01_all.dat (Fundamental) --L6--Top--
    
```

# MapScript It!

Find and mosaic required DOQs



queryByFeatures

v	q1629ne	q1630nw	q1630ne	q1631nw	c
v	q1629se	q1630sw	q1630se	q1631sw	c
v	q1729ne	q1730nw	q1730ne	q1731nw	c
v	q1729se	q1730sw	q1730se	q1731sw	c



*“When the only tool you have is a hammer, every problem starts to look like a nail.”*

