Take Your (whole) Map System With You . . .

. . . or Have Your Raspberry Pi!
(and Map With It Too)
It all started with a simple question.

Can we take a map into the field and have it work just like at the desktop but without a network connection?
A Step Back
What is Compass?

• Internal web browser based GIS data distribution system
• Developed in various forms since the late 90’s.
• Part of the primordial soup that evolved into GeoMoose
What is Compass?

- About 300 layers and 4TB of data
- SHP/GPKG/GeoTIFF/...
- PostGIS Tables/Views
- Oracle Tables/Views
- Integrations with other systems via REST/WMS/WFS/Database connections
Compass Architecture

- Metadata Database
- MapServer (as WMS/WFS Server)
- Custom Web Services
- Integrations with other systems
- Data Storage (Subversion/PostGIS)
It all started with a simple question.

Can we take a map into the field and have it work just like at the desktop but without a network connection?
Capabilities we were looking for.

- Standalone Mapping Interface.
- Ease of data synchronization.
- Ease of configuring (a partial) replication.
- Ease of operation in the field.
- Easy to connect to by multiple devices.
- Also works as a backup appliance in a pinch.
New project.

Internally we labeled the project “MiniCOMPASS” after our desktop, “COMPASS” mapping system.
What didn’t work

- Internet in the field
- Installing on existing Windows laptops/tablets
- Replicating all the data
Raspberry Pi as a Server

- Compatible with existing software stack
- Can act as a WiFi access point
- Easy to power in field (car phone charger)
- Relatively Inexpensive
The Problem

- Limited data storage (32GB and 64GB SD cards deployed)
The Solution

- Let managers pick what layers are important to their teams.
The Problem

- Compass Layers are MapServer mapfiles
- Mapfiles are complex (and not maintained by us).
- How do we know what to copy?
The Solution

• It’s Impossible.... give up, go home, get beer.
The Solution

- It’s Impossible.... drink beer...

- Realize most mapfiles, in practice, are simple
The Solution

- It’s only theoretically impossible....
- Realize most mapfiles, in practice, are simple
- Wrote a tool to analyze the dependencies of most mapfiles
- Warn if the mapfile is too complex
- Handle complex mapfiles manually
- Code available: https://github.com/klassenjs/map-deps
map_deps

$ ~/map_deps ./basemap.map
Found Mapserver:
MapServer version 7.0.4 ...
Trying mapfile "./basemap.map"
Required Files:
Refs: Filename:
    Refs:   Filename:
    1  /home/jimk/gm3-demo-data/demo/statedata/county.sbx
    1  /home/jimk/gm3-demo-data/demo/statedata/county.sbn
    1  /home/jimk/gm3-demo-data/demo/statedata/county.shp
    1  /home/jimk/gm3-demo-data/demo/statedata/county.prj
    1  /home/jimk/gm3-demo-data/demo/statedata/county.dbf
    1  /home/jimk/gm3-demo-data/statedata/symbols/symbol.sym
    1  /home/jimk/gm3-demo-data/demo/statedata/county.shx
    3  /home/jimk/gm3-demo-data/fonts/Vera.ttf
    1  /home/jimk/gm3-demo-data/fonts/fontset.list
    1  /home/jimk/gm3-demo-data/demo/statedata/basemap.map
    1  /home/jimk/gm3-demo-data/demo/statedata/muni.qix
    1  /home/jimk/gm3-demo-data/demo/statedata/muni.sbn
    2  /home/jimk/gm3-demo-data/fonts/VeraBd.ttf
    1  /home/jimk/gm3-demo-data/demo/statedata/muni.dbf
    1  /home/jimk/gm3-demo-data/demo/statedata/muni.sbx
    1  /home/jimk/gm3-demo-data/demo/statedata/muni.shp
    1  /home/jimk/gm3-demo-data/demo/statedata/muni.shx
How it works

- Manager picks layers of interest from metadata database
- Metadata database points to mapfiles
- Map-deps finds files needed for each mapfile
- Build list of all files needed
- Manually add files & tables for complex mapfiles
- Rsync flat files, sync PostgreSQL
- Cache data from other systems in PostgreSQL
Finishing Touches

• Add some scripts to automate updates when RPi on the internal network

• Realize this same process can be used for building backup nodes and DMZ servers
COMPASS

Try it at: http://
Conclusion/Questions

- We created a MiniCompass Appliance with Raspberry Pis.
- It is deployed in the field and working.
- It works, but there are still rough spots to cleanup.