Using External Data Tables with ArcGIS Online

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Tables of data are very powerful tools for doing analysis (see http://esriurl.com/funwithgistabletime), and are especially so when used within a GIS. Easy enough with full desktop GIS, but how can you with web-based tools such as ArcGIS Online? The key is to have a pre-existing shapefile covering the content for your table, so you can merge the external table with the shapefile's existing table. You can then upload the modified shapefile and use it to make new maps.

Part 1: Shapefile Exploration

Shapefiles typically consist of this set of files:

a) filename.shp (the geographic information about the features)
b) fielname.prj (the coordinate system in which the features are stored)
c) filename.dbf (the table of data, one record for each feature in (a))
d) filename.shx (the index file matching elements from (a) with elements from (c))

There may be other contents, but these are the required elements of a shapefile. To examine this, open and inspect the zipped file that included this document.

Name	Type	Size
states.dbf	DBF File	3 KB
states_bak.dbf	DBF File	3 KB
states.prj	PRJ File	1 KB
states.sbn	SBN File	1 KB
states.sbx	SBX File	1 KB
states.shp	SHP File	218 KB
states.shx	SHX File	1 KB
states.shp.xml	XML Document	3 KB

The shapefile has 8 elements: the four required items noted above, plus a spatial index (.sbn and .sbx), a metadata file (.xml), and a backup of the original .dbf file (_bak.dbf).

Open the file "states.dbf" using any software package that can open .dbf files.

IMPORTANT NOTE: Some software can view but not save .dbf files. To make permanent changes to a .dbf table, you must be able to **save files as .dbf**. This activity is written using "**Open Office**," a free, multi-platform package that includes a spreadsheet module which can read and write .dbf files. (See www.openoffice.org.)

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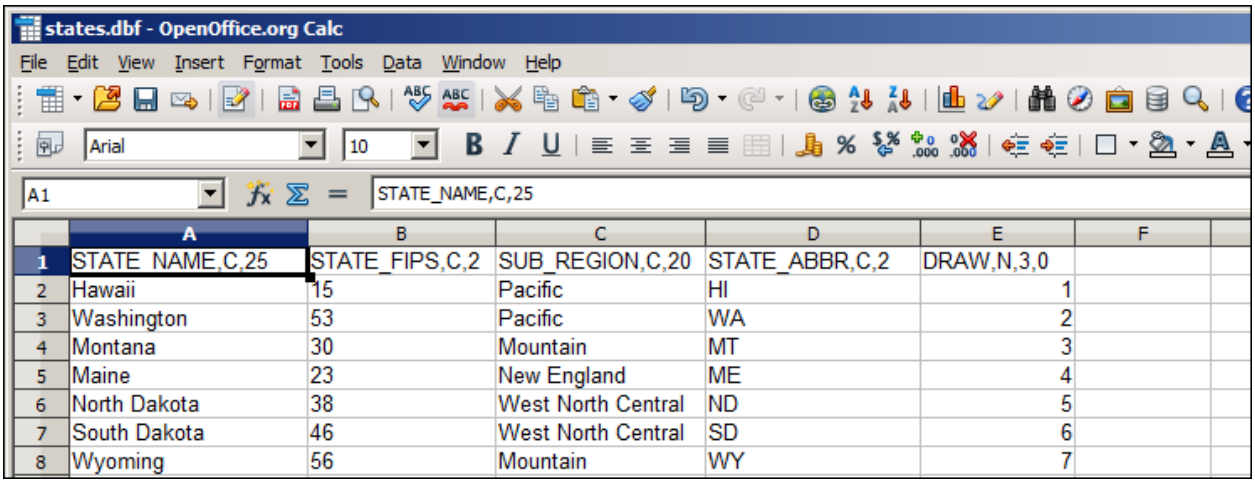
Part 2: Database Exploration



	A	B	C	D	E	F
1	STATE_NAME,C,25	STATE_FIPS,C,2	SUB_REGION,C,20	STATE_ABBR,C,2	DRAW,N,3,0	
2	Hawaii	15	Pacific	HI	1	
3	Washington	53	Pacific	WA	2	
4	Montana	30	Mountain	MT	3	
5	Maine	23	New England	ME	4	
6	North Dakota	38	West North Central	ND	5	
7	South Dakota	46	West North Central	SD	6	
8	Wyoming	56	Mountain	WY	7	

Notice that the table records are stored in what looks like a random sequence. The order corresponds with the display sequence of the features in the "states.shp" file, and **MUST BE PRESERVED**! (Saving this table in a different order would associate the above descriptors with the wrong geographic features.) The "DRAW" field was added to this file so the order can be shuffled to facilitate adding contents, and then returned to the original drawing order before saving.

DBF ("dBase") files are very particular. The field must know (and OpenOffice Calc does this by showing) whether the field is "character" (that is, alpha text) or "number", how many characters may be permitted in a cell below the title row, and, if it is a number field, how many characters will be to the right of the decimal place. Thus, "STATE_NAME" is a character field of up to 25 characters, while "DRAW" is a number field allowing up to 3 digits with 0 digits to the right of the decimal place.

DBF files also have very particular rules governing field names. The field name

- may not exceed 10 characters
- may not start with a number
- may not include a space
- may not have any "special characters" except an underscore

From this point, as long as you follow the rules, it's pretty straight-forward to merge content from an external table into "filename.dbf", using "normal spreadsheet skills." You just need to adhere to the rules precisely.

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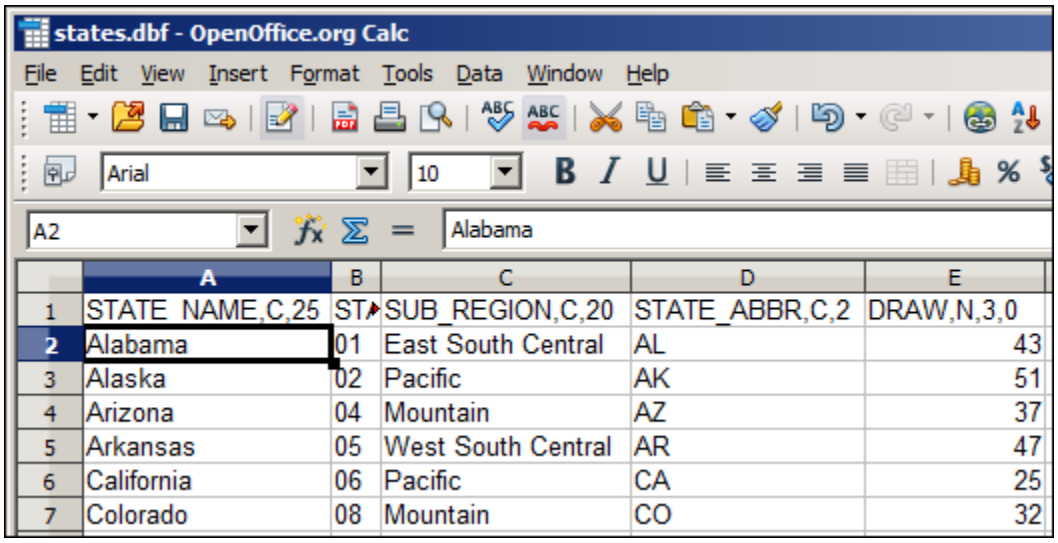
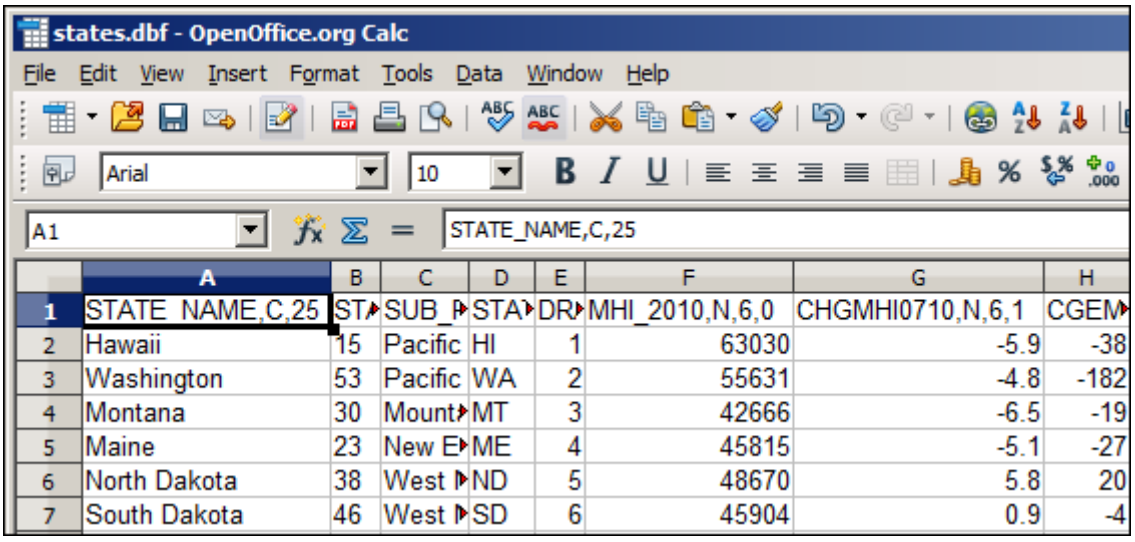
Part 3: Database Editing

a) Make sure you have a backup copy of your original ".dbf" file.
b) Make sure the .dbf includes a field like "DRAW" above, which will allow you to re-sort it into the original drawing order. **This must be established and tested before data entry and saving.**
c) Sort the table into a sequence that facilitates adding data.



	A	B	C	D	E
1	STATE_NAME,C,25	STA	SUB_REGION,C,20	STATE_ABBR,C,2	DRAW,N,3,0
2	Alabama	01	East South Central	AL	43
3	Alaska	02	Pacific	AK	51
4	Arizona	04	Mountain	AZ	37
5	Arkansas	05	West South Central	AR	47
6	California	06	Pacific	CA	25
7	Colorado	08	Mountain	CO	32

d) Add the new data (keystroking or using copy/paste).
e) Create the field names according to the rules in Step#2 above.
f) Re-sort the file according to the original draw order.



	A	B	C	D	E	F	G	H
1	STATE_NAME,C,25	ST	SUB_R	STA	DR	MHI_2010,N,6,0	CHGMHI0710,N,6,1	CGEM
2	Hawaii	15	Pacific	HI	1	63030	-5.9	-38
3	Washington	53	Pacific	WA	2	55631	-4.8	-182
4	Montana	30	Mount	MT	3	42666	-6.5	-19
5	Maine	23	New E	ME	4	45815	-5.1	-27
6	North Dakota	38	West	ND	5	48670	5.8	20
7	South Dakota	46	West	SD	6	45904	0.9	-4

g) Save the file in the proper "filename.dbf" format, over-writing the original.

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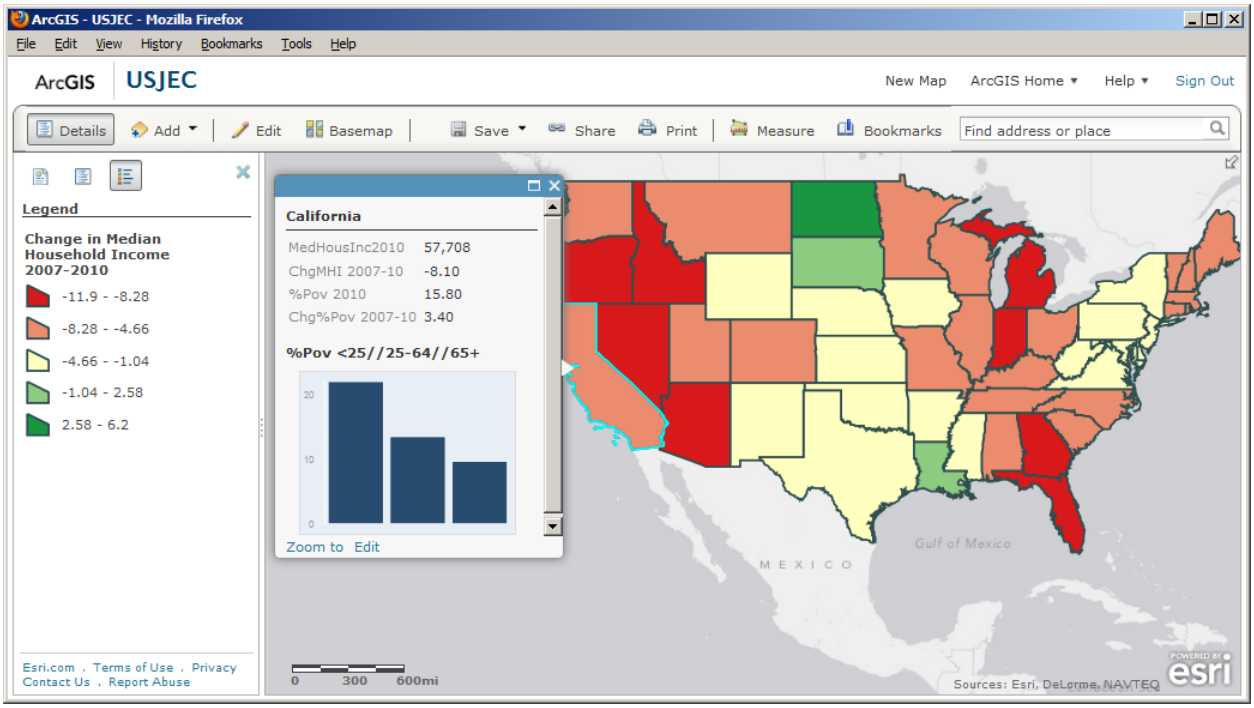
Part 4: Checking Results

Test the results with a GIS, such as ArcGIS Desktop, ArcGIS Explorer, or ArcGIS Online. If the results are not what you expected, return to **Part 3** above.



This example uses data from a report by the US Congress Joint Economic Committee, http://1.usa.gov/owGKbj
I downloaded the 4-page PDF file, extracted the data table into a spreadsheet, joined the data into the shapefile above, posted it into ArcGIS Online, and created a classification and popup scheme that matched my goal.