Community Notebook

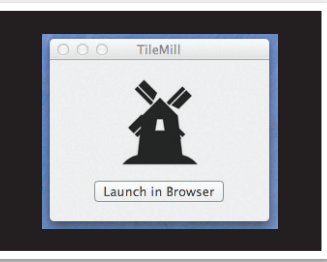## Free Software Projects

Projects on the Move

Figure 1: TileMill launches in a browser.

This month, we explore open source science projects. The young TileMill project is a powerful mapping tool for cartographers, HUBzero provides a platform for scientific collaboration, and the NASA-sponsored Virtual Microscope magnifies specimens without breaking any glass slides. *By Rikki Kite*
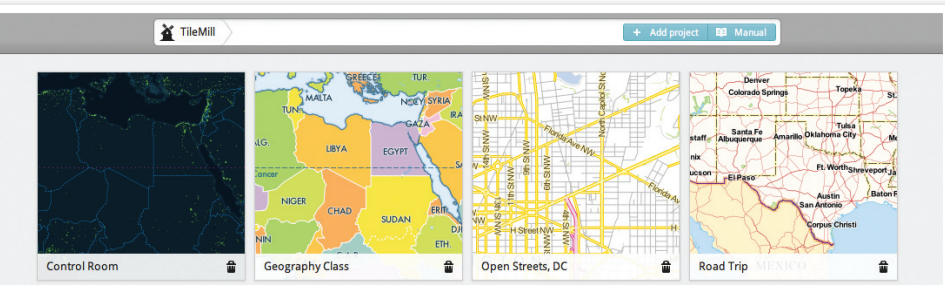

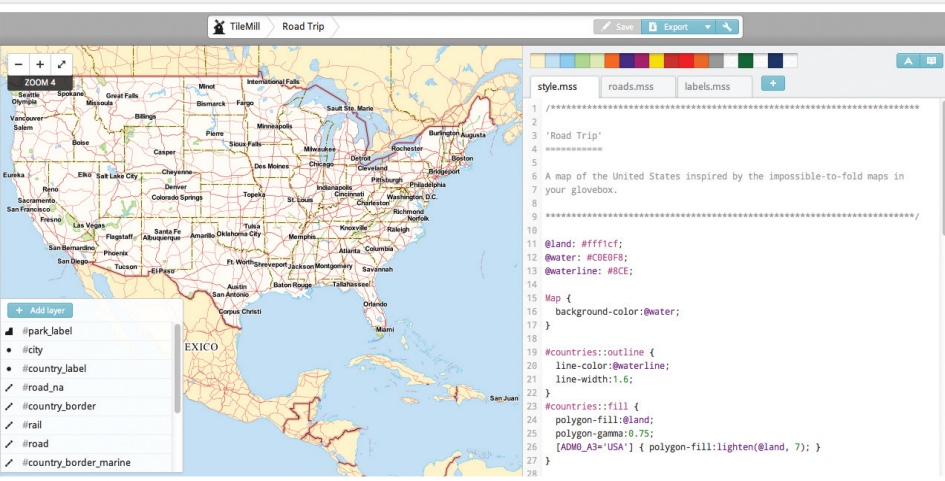**Figure 2:** Sample projects illustrate some diverse TileMill cartography projects.

Figure 3: The Road Trip project routes US highways and destinations.

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TileMill 0.4.1 [1], an open source MapBox project built on Mapnik, was released in August 2011 and is available for Mac OS X and Ubuntu. MapBox is a Development Seed [2] product that provides open source tools to create and host custom maps. "TileMill was built because we needed better tools for quickly designing beautiful maps with custom data," says Development Seed Developer Will White. "We kicked off development of Tile-Mill at the beginning of 2011, and the first version was released on February 16th, 2011." White says that TileMill makes it easy to create highly customized, interactive maps for the web. "With TileMill, you design maps using Carto, a map styling language that looks just like CSS," White says. "TileMill allows you to export your finished maps as MBTiles files, which can be loaded into TileStream, an open source map server," he says.

TileMill's detailed manual [3] will get you up and running after installation. The manual offers a primer on GIS, map projections, and coordinate systems and provides a tour of the TileMill interface. After launching TileMill in a browser (Figure 1), you will see several sample projects (Figure 2) and options to add a project or see the manual. If you open the Road Trip project (Figure 3), for example, you'll see the toolbar, stylesheet editor, map preview, and a layers list. Here, you can adjust fonts or colors, zoom in or out, add new layers, and export the map. Clicking on the book tab in the top right-hand corner of the style sheet (shown in Figure 3) opens up a Carto reference menu (Figure 4).

Another sample project in the first TileMill browser window could be useful for geography lessons in the classroom. Mousing over a country in the Geography Class

project shows you the country's flag (Figure 5). Zooming in allows you to see the country's capital, too.

Although the TileMill project is young, some impressive map projects have already launched. For example, Internews released a map illustrating incidents of violence against journalists in Afghanistan since 2001 (Figure 6) [4]. Circles on the map are sized to illustrate the number of incidents in an area, and clicking on the circles opens windows that show the name of the province, number of violent incidents graphed by year, and details about the province, such as population, adult literacy, and NATO lead nation (Figure 7).

In April 2011, MapBox announced TileStream Hosting for TileMill map projects and plans for the TileMill Appliance [5]. "The appliance has the hardware required to run multiple complex map rendering jobs at once, and the entire package is covered by support from MapBox, so there's no need for an in-house technical team to manage it," White says.

"Right now, TileMill only runs natively on Linux and Mac OS X, so the MapBox appliance helps Windows-based offices use TileMill as well," he adds. If you would like to hang out with the MapBox teams, you can find them at #mapbox on *irc.freenode.net*.

HUBzero

In April 2011, researchers at Purdue University released HUBzero version 1.0, an open source platform for scientific collaboration [6]. HUBzero is packaged and tested for Debian GNU/Linux 5.0 and as virtual machine images [7]. HUBzero hosting plans are also available on the project website and prices include setup, maintenance, and support.

HUBzero lets users access and interact with graphical simulation tools through a browser. The project site says the project allows users to visualize results without reserving time on a supercomputer and to deploy new tools without having to rewrite code for the web. "The HUBzero infrastructure includes a tool execution and delivery mechanism based on Virtual Network Computing (VNC). Any tool with a graphical user interface can be installed on the hub and deployed within a few hours," the site says.
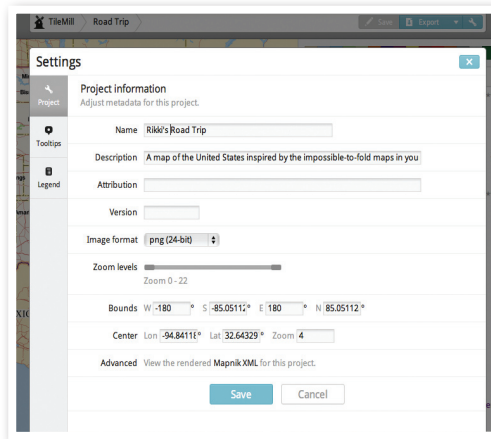

Figure 4: The Carto reference menu provides a crash course in cartographic terms.

Figure 5: See the flags of the world in a virtual geography class.

Figure 6: This dynamic TileMill map pops up statistics when you click a circle.

Users can also access online presentations, which are delivered using Macromedia Breeze. Although uploading presentations and PDF files is easy, uploading tools can be more challenging. Each "hub" includes a companion site for source code development, and each tool has its own project area with a Subversion repository, bug-tracking ticketing system, and wiki area for documentation. Users can also rate and comment on resources, post citations, tag content, and create topic pages with standard wiki syntax.

The project software allows users to create and manage their groups, giving them control over who accesses their content. Hubs offer other features, such as calendars and event posting, usage metrics, and a user support area that can be managed by a designated hub admin. On the HUBzero project site, you can add your group and search for other groups (Figure 8) [8]. To see the platform features in action, visit the nanoHUB.org website, which is based on the HUBzero platform.
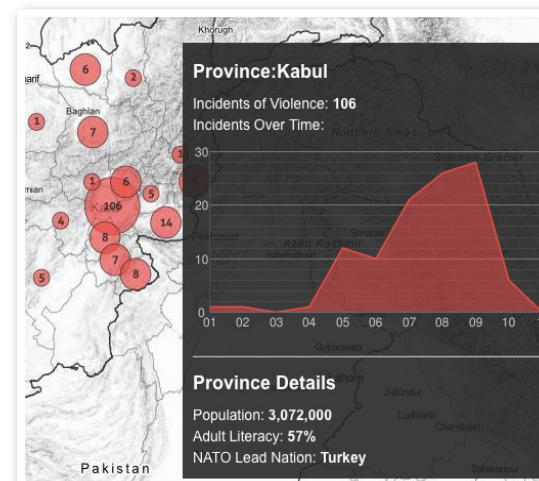

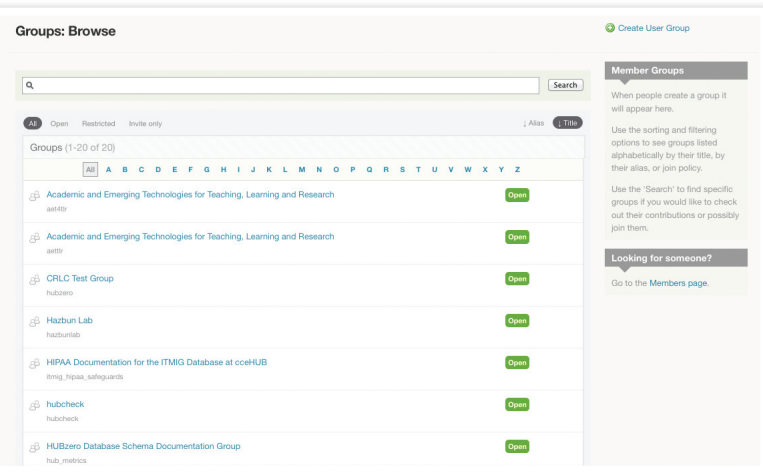**Figure 7:** Details embedded in a map.

Figure 8: **Search for groups, add your own group, and share content.**

In April, HUBbub 2011 was held in Indianapolis, Indiana. The HUBzero conference included tutorials and a talk about nanoHUB.org's effect on research and education. The conference presentations and breakout session materials are available on the event website [9].

Virtual Microscope

The NASA-funded Virtual Microscope provides simulated scientific instrumentation for students and researchers [10]. The free software runs on Mac OS X, Windows, or Linux, as long as Java is in-

stalled. The open source code for the project is available for download from SourceForge [11].

After you install a virtual microscope, launching the software opens the My Specimen Collection screen, with an option to download specimens that are then added to your collection (Figure 9).

To view an image under your virtual microscope, open a specimen and adjust the settings and magnification to your liking. To get the effect of moving a slide around for different views, move the specimen with your cursor (Figure 10). Clicking *Unload* closes the specimen and returns you to the specimen collection screen.

The specimen samples were collected with the use of custom software that runs a Philips XL-30 environmental scanning electron microscope. To learn more about the specimens, visit the Imaging Technology Group's virtual project page [12]. ∎∎∎
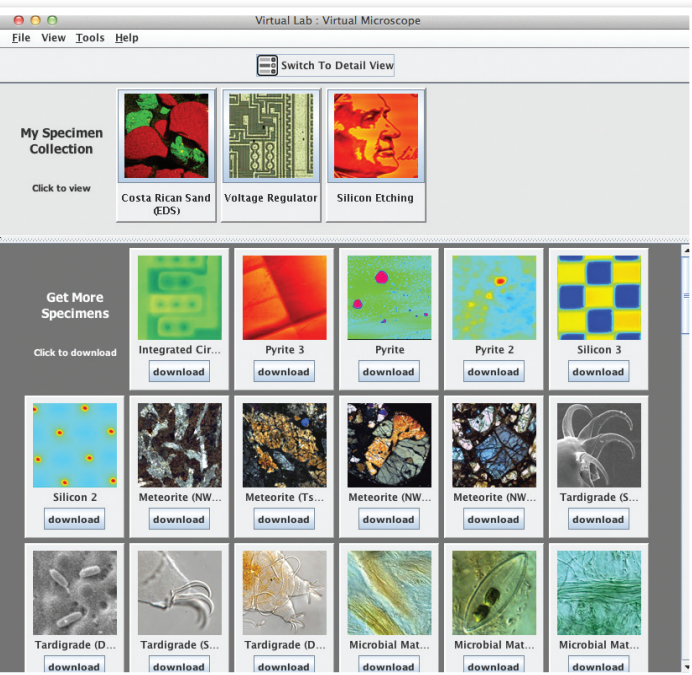

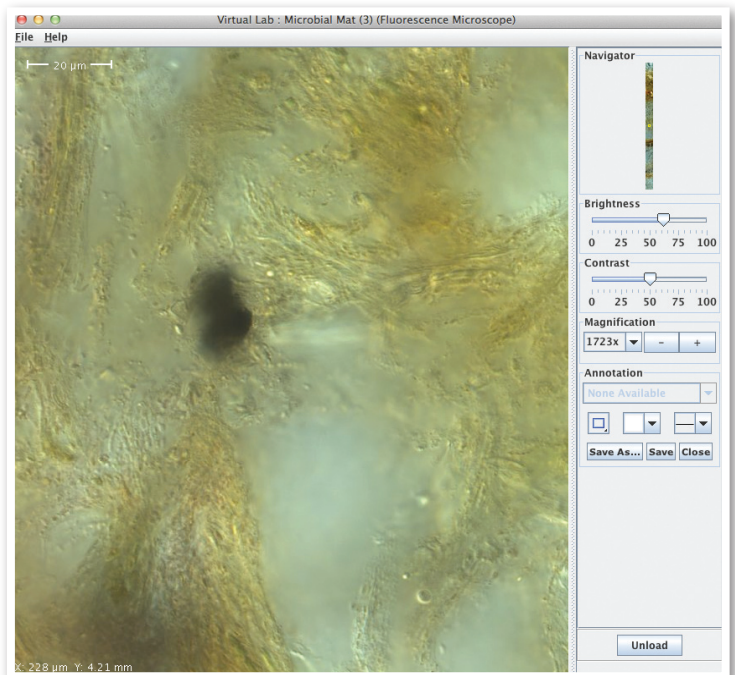Figure 9: **Specimens are downloaded from the launch screen.**

Figure 10: **Controls let you adjust brightness, contrast, and magnification.**

INFO

[1] TileMill: *http://tilemill.com*

[2] Development Seed: *http://developmentseed.org/*

[3] TileMill manual: *http://tilemill.com/pages/manual.html*

[4] Violence Against Journalists in Afghanistan (2001-2011): *http://data.nai.org.af/*

[5] MapBox announcement: *http://developmentseed.org/blog/2011/apr/26/mapbox-launches-tilestream-hosting-and-announces-tilemill-appliance*

[6] HUBzero: *http://hubzero.org/*

[7] Download HUBzero: *http://hubzero.org/news/version*

[8] HUBzero groups: *https://hubzero.org/groups/browse*

[9] HUBbub 2011: *https://hubzero.org/hubbub2011*

[10] Virtual Microscope: *http://virtual.itg.uiuc.edu/*

[11] ITG Virtual Lab code: *http://sourceforge.net/projects/virtuallab/*

[12] Virtual Lab specimens: *http://virtual.itg.uiuc.edu/data/*