COVER PAGE

Application Name: Virginia Education Geospatial Analysis System (VEGAS)

Application Link: http://www.starsman.com/VEGAS.html

Video Link: http://www.starsman.com/VEGASVideo.html

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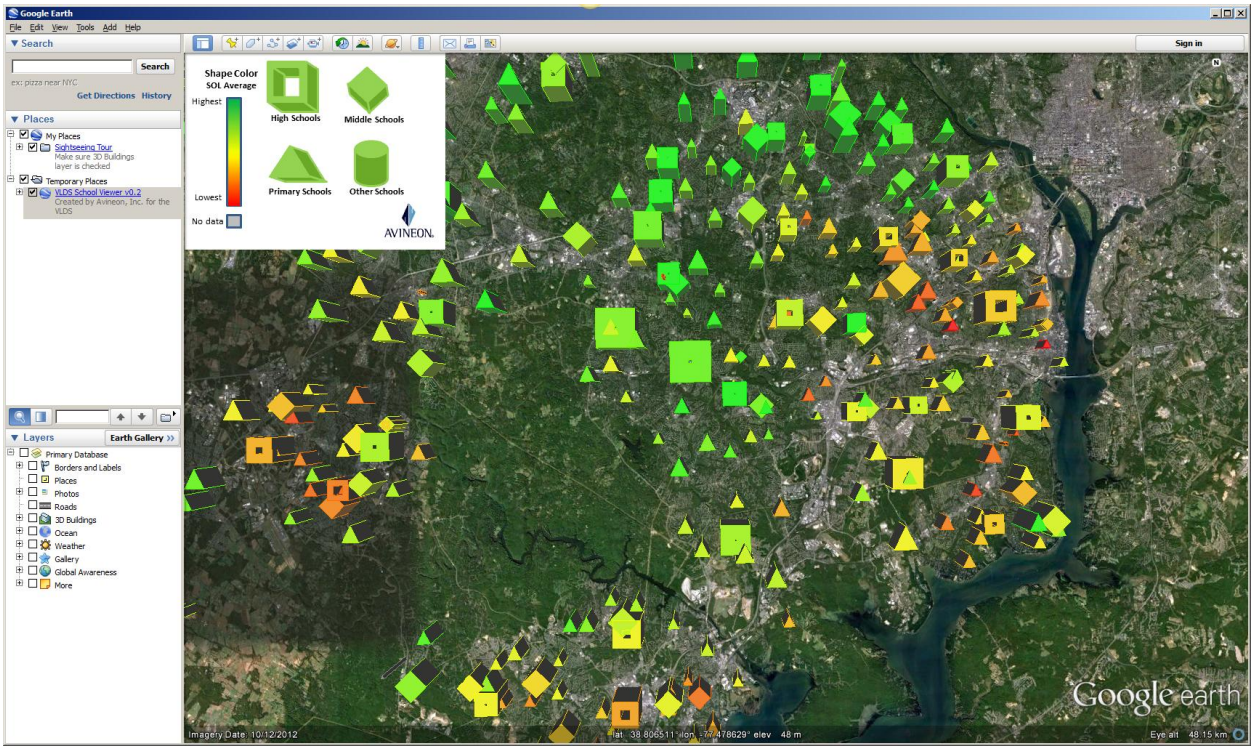


OVERVIEW

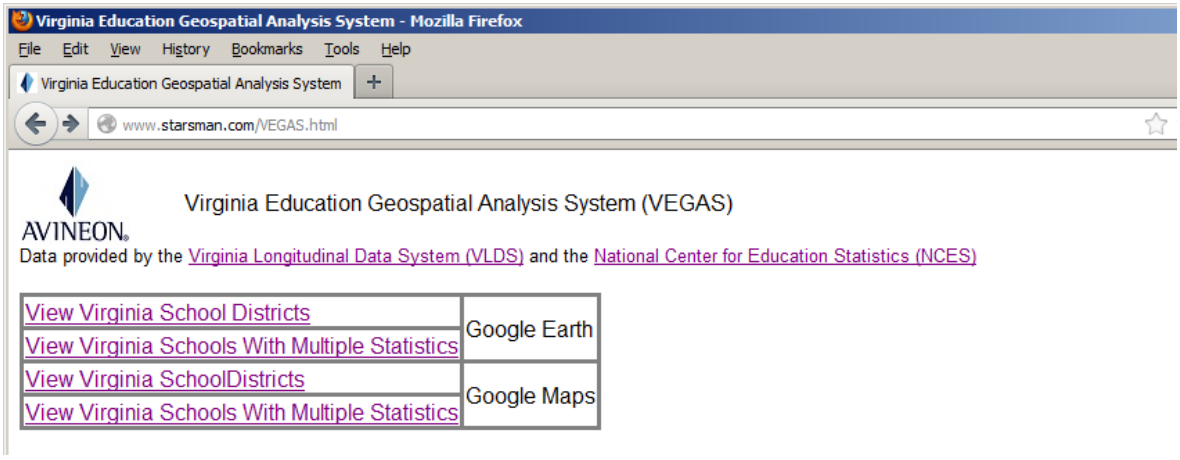
The VEGAS application is intended for use by educational specialists, Virginia residents, or other educational stakeholders to rapidly and easily view a wide range of educational information and assist in decision-making. The application is designed to be used across a wide variety of devices including desktops (Windows, Mac, or Linux), tablets (iOS, Android, or Windows Mobile), and smart phones and provide a wide range of school data useful to assist decision-making relative to Virginia public education.

Traditional approaches to statistical display use a limited number of dimensions to display data. Most often a multitude of conventional devices such as pie charts, graphs, and other such mechanisms are used to describe a complex data set. The VEGAS application takes the approach of providing a wide-variety of easily consumed statistical information in a single view. This application simultaneously displays up to 6 variables about each school:

- School location
- School student membership
- Grade range of students
- Average SOL score
- Dropout rate (for High Schools)
- Student to teacher ratio

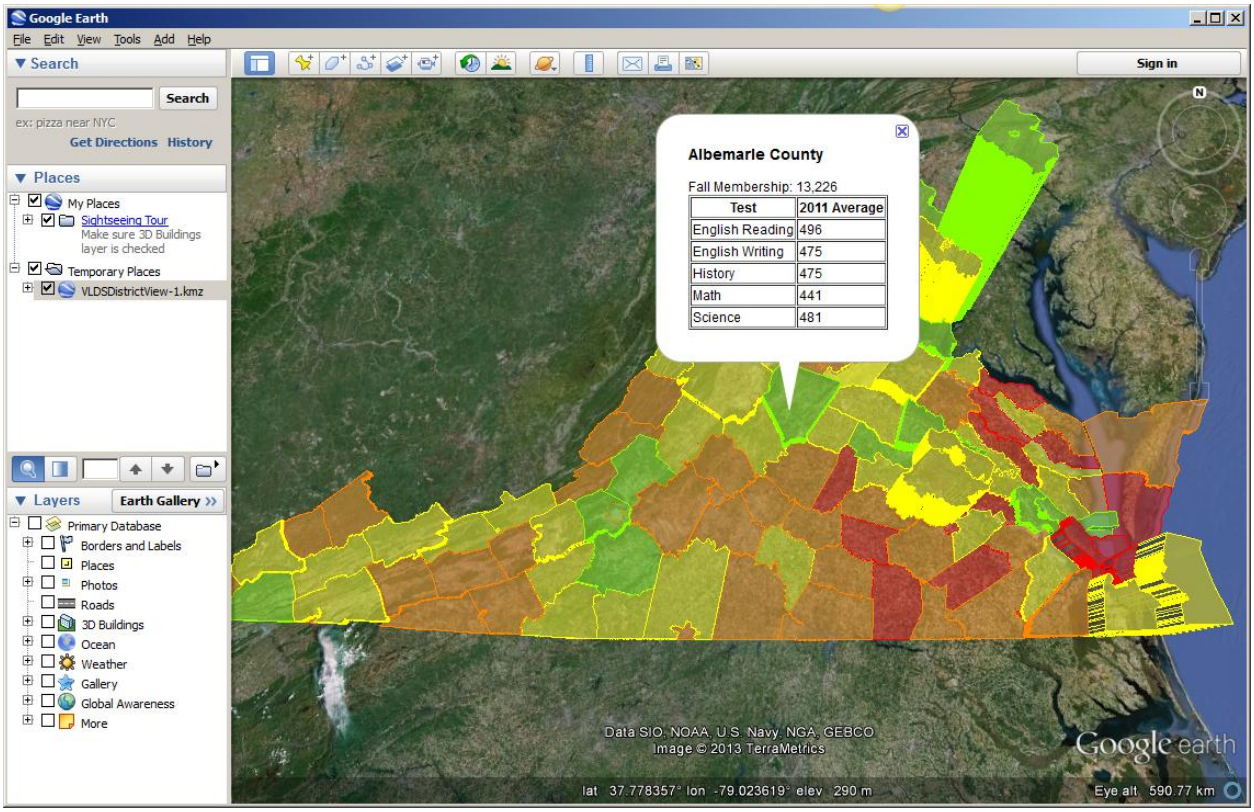
INSTRUCTIONS FOR USE

The application can be accessed either via Google Earth (preferred) or via the web on Google Maps. To use the application, simply browse to http://www.starsman.com/VEGAS.html. This is the VEGAS index and provides convenient links to the various VEGAS components.



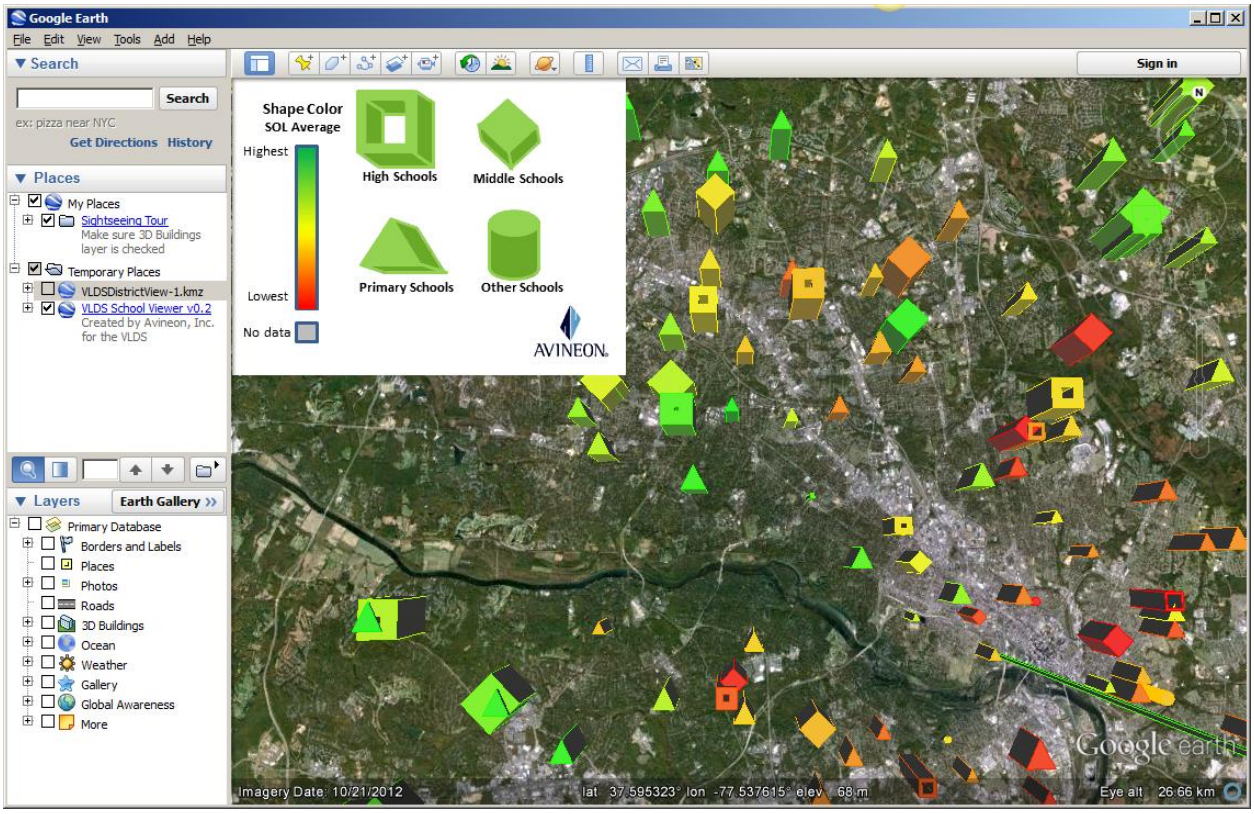
There are two different views each of which may be used in either Google Earth or Google Maps. The Google Earth versions provide a better interface and view of the data but requires the user to have Google Earth installed on their device. The Google Maps version works on almost every browser but the interface is not as easy to use the the altitude dimension is not represented.

Clicking the Virginia School District link for Google Earth on a device with Google Earth installed will load the application and invoke Google Earth for display. The result should look something like the figure below.



This view displays each of the school districts in the state. The total school membership is represented by height of the district and the average SOL score is represented by the color with green representing the highest scores and red representing the lowest. A description of the color scale will be given later in this manual. Detailed SOL and membership information for each district can be seen by clicking on the district in question.

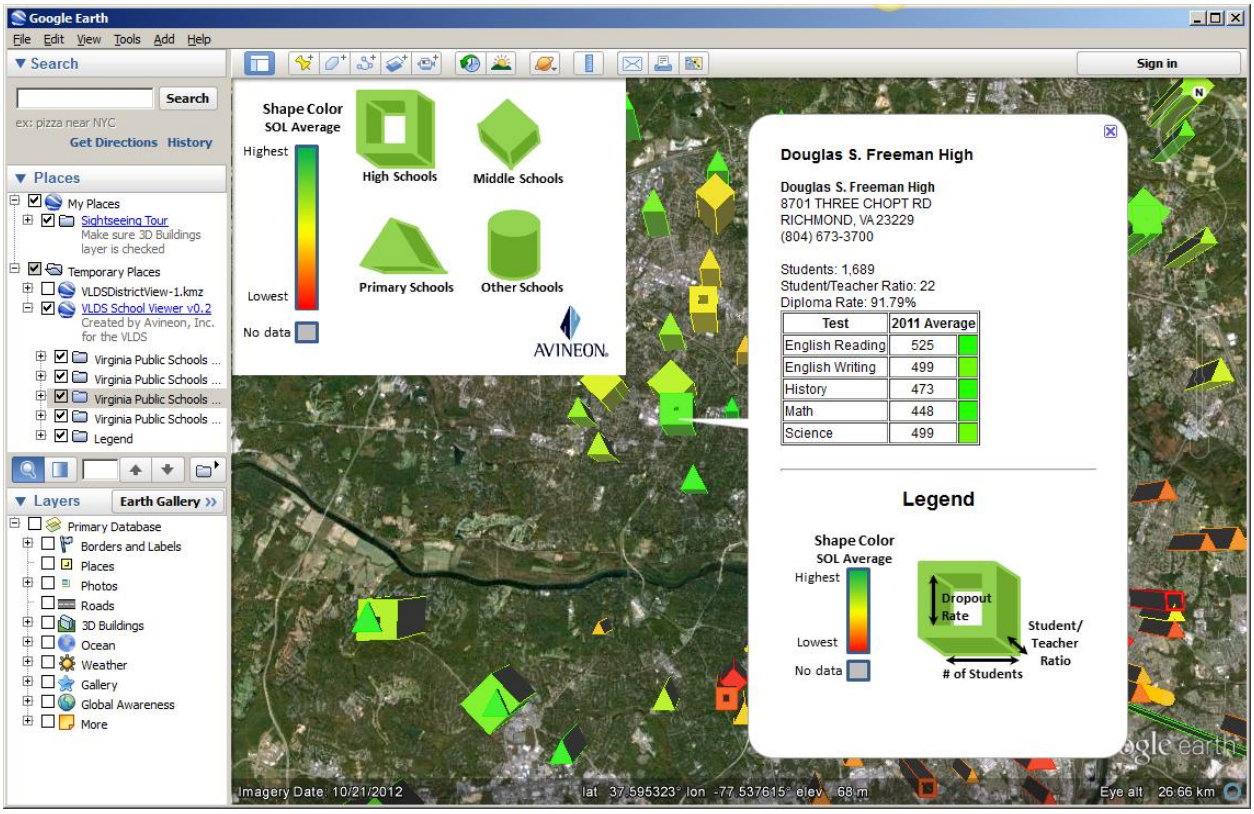
Clicking the link to the Google Earth version of the Multiple Statistic information on a machine with Google Earth installed will load individual information about each school. It is probably best to uncheck the District View in the Places list on the left of the GoogleEarth application. For the following examples, we will zoom into Richmond and discuss the specific schools and how the data is presented in the figure below.



A legend is provided in the top left corner of the display for reference. It can be hidden by clicking on the School View tree in the Google Earth Places list and unchecking 'Legend'. Schools are represented by one of four shapes. High schools are a cube, middle schools by a diamond, primary schools by a triangle, and schools that don't align with any of these other three categories by a circle. The size of the student body is represented by the schools size on the map; schools with larger membership counts will appear larger on the map. The height of the symbol represents the student to teach ratio for the school. The opening in the center of the high school symbol is proportional to the dropout rate. The color of the school represents its relative performance on SOLs and is explained in more detail later in this manual.

Clicking on a school on the map will bring up additional details about the school and its performance an example of which is shown in the figure below.

These additional details include the address and phone number for the school, average score results for each of the subject tests, the membership count, student to teacher ratio, the dropout rate, and a legend to indicate the relationship of these statistics to the figure displayed within Google Earth.



Both the district and school views discussed above can also be displayed on a web page for users without Google Earth but the ease of use is significantly diminished as well as the loss of the altitude dimension.

APPLICATION TECHNICAL DETAILS

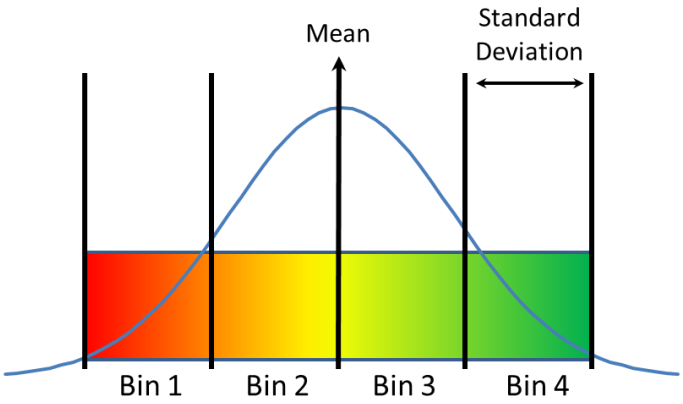
Data Sources and Processing

This application uses data from the Virginia Longitudinal Data System (VLDS) and from the National Center for Educational Statistics (NCES). The initial process in application architecture was to understand the data sets and determine which best met application requirements. As this application required geospatial knowledge, the NCES data was used to extract school location, address, phone number. The student to teach ratio was also drawn from this data as it was not available in the VLDS data set. Three VLDS data sources are used in this application: the Fall Membership data, the annual dropout rate, and the Test Data. Other data sets could easily be added to increase information available.

Having identified the necessity of integrating VLDS and NCES data sets, a mechanism was required to link the two sets together. Unfortunately, no common key was readily apparent. Instead, mappings were developed between the VLDS and NCES school districts and between the VLDS and NCES schools. Some automated processing was used to build the mappings, but ultimately some manual processing and checking was necessary to map all of the schools.

Since the application was going to compare SOL scores and use a color coding scheme to visualize the relative rating between schools, it was necessary to develop a mechanism to compare the

scores. The first thing to note was that the SOL scores at the various levels (e.g. Elementary, Middle, and High School) are not the same and should be compared only to schools at the same level. A 4-tiered system was created and the schools sorted into this based upon the grades at the school. SOL score mean and standard deviations were calculated for each test at each level. These statistics were used to create bins for each test and level. The bin scores received by the school for each test were then averaged to calculate the final total bin score for a school with all but 50 of 1800 schools falling in the range from -2 to 2. This effectively placed each school in one of four bins as shown in the figure below.



Schools scoring below bin 1 were placed at the bottom of bin 1 and schools above bin 4 were place at the top of bin 4. Colors according to a red-yellow-green scale such as that shown above were then applied to each school based on their bin score. This value is used to color code the school in the application. Because of the nature of the normal distribution, the majority of schools are in bins 2 and 3 and most will be colored from an orange to a yellow-green.

Application Architecture

Having developed an integrated data source from VLDS and NCES data, it was necessary to determine an application architecture that would be capable of consuming the data, displaying it in a user-friendly manner, and be capable of operating on a multitude of devices. Through research and testing, it was determined that Google Earth was a good environment within which to develop this application. However, there are a number of other 2- and 3- dimensional environments which might be suitable as well such as Microsoft Virtual Earth, NASA World Wind, and ESRI Arc View.

The application is essentially a Keyhole Markup Language (KML) file. The file was generated by a script running against a database containing the VLDS and NCES data to produce the various display elements.

SUMMARY

The VEGAS application successfully integrated data from three VLDS data sources with other general data from NCES to produce an application to help users rapidly analyze school data. This application increases the value of VLDS data by making it easier to read and interpret, particularly relative to other schools. The unique approach to statistical representation of this data will speed analysis and assimilation of this information.