

A White Paper

The District Data Analyzer: A Low-Cost,
High-Impact Alternative to a Data
Warehouse

for
Excelsior Software



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1.0 Executive Summary

The District Data Analyzer delivers the reporting capability of a data warehouse without the associated cost and complexity, providing instantaneous access to useful information.

Educators understand the importance of data-based decision making as they struggle to meet the challenges of increased accountability. But collecting, accessing, and analyzing data is often a frustrating and time-consuming experience. While some states and districts have developed data warehouses as vehicles to collect, store, and analyze data, others have concluded that warehouses are too expensive and complicated to be a viable option. As a result, many teachers and administrators don't analyze data — and accountability is more difficult to achieve.

Excelsior Software has developed a viable alternative to the data warehouse: the District Data Analyzer (DDA), a cutting-edge tool that delivers the reporting capability of a data warehouse without the associated cost and complexity. The DDA uses a technology called Associative Query Logic™, which greatly simplifies the process of accessing and analyzing data. The result is a tool that can be up and running in weeks (as opposed to the months or years required to build a data warehouse), that provides answers to queries in seconds instead of hours or days, that requires no new hardware, that teachers and others can use after less than an hour of training, and that provides on-the-fly reports that can be saved as PDF files, Word files, or Excel spreadsheets, or copied to other Microsoft Office applications. Initial costs are less than a third of the cost of a data warehouse, on average, and ongoing costs are also considerably less because the DDA doesn't require a highly trained tech staff to maintain.

The DDA is making a difference for education organizations because it makes data easily accessible to people throughout the organization, provides the kind of information that teachers need to improve teaching and learning, simplifies the reporting process, and allows more efficient and effective use of resources.

Excelsior Software's reputation for high-quality products such as the Pinnacle Plus System now extends to the DDA.

The company behind the DDA, Excelsior Software, is well known as a pioneer in the field of electronic gradebooks. Today it is a leader in assessment management software, including the Pinnacle Plus System, which was developed in collaboration with Robert Marzano and is endorsed by the Association for Supervision and Curriculum Development. The company's reputation for quality products and service continues to impress its clients who are using the DDA, including the Bellevue School District in Washington State, a Baldrige award winner; and Natrona County Public Schools in Casper, Wyoming.

The DDA is an option for states and districts that don't have the time, money, or technical resources required to build and maintain a data warehouse.

2.0 An Alternative to Data Warehousing

Public calls for accountability and government mandates related to *No Child Left Behind* have today's educators facing unprecedented demands to increase student achievement. In searching for ways to meet the challenge, educators have come to realize the value of reliable data as a critical element in informing decisions related to teaching, assessment, curriculum, professional development, and many other areas. Many states and districts have purchased or developed traditional data warehouses, which provide a repository for data and complex tools for data analysis. But many others find that data warehouses are not a viable option because they cost too much, take too long to build and implement, and require end-users to have a higher level of technical expertise than most people in the organization possess. Accessing and attempting to use available data becomes a time-consuming, difficult, and sometimes futile task. As a result, many teachers and administrators don't analyze data—and accountability is more difficult to achieve.

Fortunately, educators now have another option: a cutting-edge technology tool that delivers the reporting capability of a data warehouse without the associated cost and complexity. This tool, the District Data Analyzer (DDA), is a viable alternative to a data warehouse. It is currently used in more than 30 school districts in the United States, as well as the Wyoming State Department of Education.

2.1 How It Works: The DDA Versus a Data Warehouse

Building a traditional data warehouse requires a series of complicated steps:

- defining the various data sources (such as student information systems, finance systems, HR systems, and so on);
- “scrubbing” the data to eliminate inconsistencies and other potential problems;
- building “data cubes,” the multidimensional units that relate data items to each other; and
- creating the interface that allows the end-user to access and work with the data.

In many cases, the first few steps take many months, if not years to complete. Time that could be spent actually *using* the data is instead spent creating the elaborate system that houses the data.

The DDA uses a technology that greatly simplifies the process of accessing data, so data analysis is quick and easy.

The DDA takes advantage of a simpler technology than the technology that underlies a traditional data warehouse. This technology, called Associative Query Logic™ (AQL™), was developed in Sweden in 1993 and has been used in data analysis tools in Europe since the mid-1990s. In the United States, it is taking over the data analytics field in business and is gaining credibility as a result of the successful experience of corporate giants such as Wal-Mart, Merck, and Pfizer.

In traditional systems, the same piece of data — a student ID number, for example — may reside in hundreds of places. In AQL systems, a piece of data occurs only *once*. Using AQL, the District Data Analyzer extracts data elements from various existing data sources to form a Data Cloud™. The Data Cloud cleans up the data as it loads, eliminating inconsistencies and redundancies. Building the Data Cloud requires fewer steps and is much simpler than building a data warehouse.

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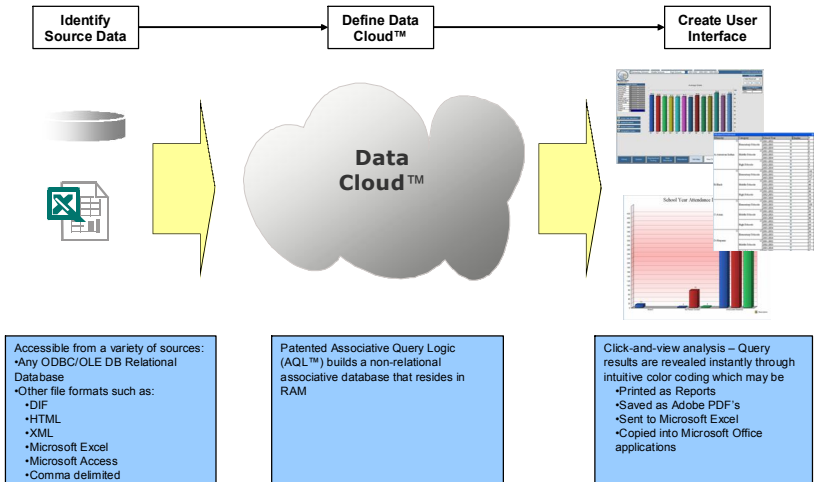
In traditional systems, the same piece of data — a student ID number, for example — may reside in hundreds of places. In AQL systems, a piece of data occurs only *once*. Using AQL, the District Data Analyzer extracts data elements from various existing data sources to form a Data Cloud™. The Data Cloud cleans up the data as it loads, eliminating inconsistencies and redundancies. Building the Data Cloud requires fewer steps and is much simpler than building a data warehouse.

No new hardware is required for the DDA—it can reside in the RAM of a laptop.

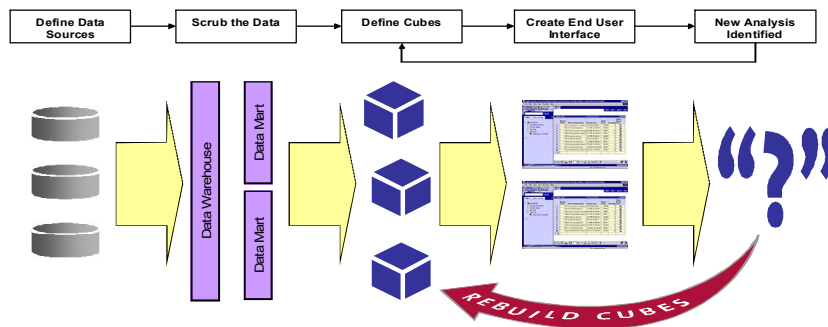
Because the Data Cloud generally is only 15 to 20 percent of the size of the original source data, the entire DDA can reside in the RAM that already exists on most computers, including laptops. Online operation requires only minimal bandwidth. The compact size of the Data Cloud also allows data to be retrieved, combined, and manipulated almost instantaneously.

In a traditional data warehouse, the need to define complex hierarchies and build data cubes limits the flexibility of analysis tools; only the information that has been built into the cubes is available for processing, and so users are limited to a predefined set of data. If they want to get a report or conduct an analysis that doesn't correlate to an existing cube, the cube must be rebuilt — a process that requires a lot of time and expertise. The District Data Analyzer eliminates hierarchies and cubes. On-the-fly queries generate a response in less than a second. Reports can be modified without changing the data structure.

DDA Process



Traditional Data Warehouse Structure



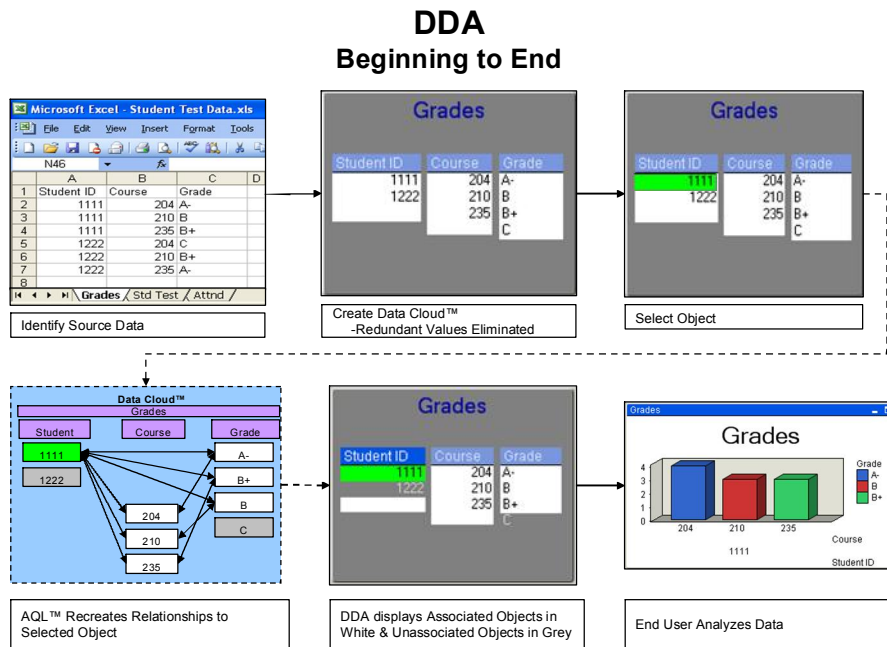
Users can quickly generate reports as PDF files, Word documents, or in other formats.

The DDA can be up and running in as little as 30 days.

The District Data Analyzer's point-and-click user interface provides optimal functionality. A user can select an object and view all associated items in an instant. Query results appear in whatever format the user prefers — color-coded charts, tables, list boxes, and so on. The results may be printed as reports, saved as PDF files, sent to Microsoft Excel, or copied to other Microsoft Office applications.

The simple technology and easy-to-use interface of the District Data Analyzer make it possible for people with little previous experience in databases to use the tool with minimal training. The typical end-user can be trained in *minutes*; “power user” training requires about *one day*, and developer training can be accomplished in *two or three days*. The lengthy training period associated with learning how to navigate traditional databases is largely eliminated — along with the costs.

Similarly, the District Data Analyzer requires only a fraction of the time required to construct a traditional data warehouse and get it up and running. Whereas a data warehouse may require two or three years to assemble, the District Data Analyzer is typically installed and functioning within three months — and sometimes within as little as 30 days. Again, this reduced time frame translates into significant reductions in cost.



Benefits of the DDA compared with a traditional data warehouse include speed, flexibility, ease of use, and lower initial and ongoing costs.

2.2 What It Is Not

The District Data Analyzer does not have the collection and storage capabilities of a traditional data warehouse. Rather, it provides a powerful, flexible tool for data reporting and analysis. As such, it can complement and enhance a state or school system's existing data warehouse. And for organizations without the money and expertise required to build and operate a data warehouse, it can serve as a standalone product, integrating existing, dispersed data sources, including the student information system, curriculum management system, HR system, and state and district assessment data.

Jeannette: It would be nice to insert a brief text-box case study here, highlighting some of the benefits as perceived by a school district using the DDA. Do you have anything other than Bellevue or Natrona (which we refer to below)? I sent Lyla Downey an e-mail requesting responses to a series of questions that would have provided this kind of info, but I never heard back from her.

2.3 Benefits

Compared with a traditional data warehouse, the District Data Analyzer offers a number of significant benefits:

- **Time** — The DDA can be constructed in weeks, not months or years.
- **Speed** — Retrieval of information and analysis of data occurs almost instantaneously. Output that may take days to produce using traditional data warehouse tools can be obtained in seconds.
- **System requirements** — The entire DDA resides in RAM. No new hardware is required.
- **Flexibility** — Queries and output are not limited by predefined data sets; as a result, users get instant responses to on-the-fly queries, and they can easily modify reports and other output.
- **Personnel** — Operating and maintaining the DDA does not require a large staff of highly trained technology management personnel.
- **Ease of use** — People with little or no previous experience with a database find the tool easy to use.
- **Money** — Initial and ongoing costs are significantly lower. Whereas a traditional data warehouse may cost an average of about \$600,000 to purchase, the DDA costs an average of about \$180,000. Because management and support of the DDA does not require extensive IT capacity or training, ongoing costs are also less.

3.0 Making a Difference

Educators need to improve accountability and increase student achievement, and the District Data Analyzer can help them do both. Specifically, the DDA can make a difference by —

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- making data accessible to users across the organization,
 - efficiently delivering the kind of data that teachers need to make instruction more effective,
 - simplifying the reporting process, and
 - allowing resources to be deployed more efficiently and effectively.

3.1 Data Accessibility Across the Organization

Many districts can be described as “data rich and information poor” because accessing data is a cumbersome, time-consuming process or access is limited to those with advanced technical know-how. In addition, once the data is accessed, it may be difficult to interpret

The DDA puts the power of data-based decision making into the hands of teachers, principals, and others throughout the system.

The DDA puts the power of data analysis in the hands of central office administrators, principals, teachers, and others who face the day-to-day challenges of improving student achievement. Access to data and the ability to use it to inform decisions is broadly dispersed throughout the education system — to everyone who makes decisions that affect student learning and, ultimately, the success of the system.

Michael N. Riley, superintendent of the Bellevue School District in suburban Seattle, says he’s convinced that the District Data Analyzer is “the tool we need to make all the professionals in this system ‘data hounds.’ When that happens, we will be a much better school district.”

Bellevue School District began using the DDA in August 2004. Superintendent Michael Riley recently described the impact it has had on his work:

While having access to the tool for only a few months, I have already been engaged in countless conversations when the need for data presented itself and I was able to conduct an analysis in no time and inform the debate with actual facts instead of just guesswork. I have also used DDA to mine for issues. I have, for example, examined how many of our minority students, free/reduced lunch recipients, and ELL students are enrolling in advanced classes; how many students with low standardized test scores have been in our school system three or more years; how many students who take a math support class in sixth grade reach calculus by twelfth grade; and so on. In the past, these questions would take me weeks to answer and would tie up a number of staff charged with conducting the research. Now, whatever question crosses my mind can be answered within minutes.

Teachers can use the DDA to quickly find information that can make a difference in teaching and learning.

3.2 Making Instruction More Effective

Some analysts estimate that only 10 percent of the data that education organizations maintain is actually meaningful in terms of its potential impact on instructional decisions. For example, data related to transportation or test scores from five years ago may not be useful in finding ways to individualize instruction for the students a teacher faces *today*. The efficient technology of the District Data Analyzer allows easy access to information that *does* matter — that can help a teacher begin to understand why certain students are struggling and what kinds of approaches might improve the situation.

Here are a few of the kinds of questions a teacher might ask:

- What is the breakdown of my class in terms of gender, ethnicity, special ed, ELL?
- Are certain groups of students consistently underperforming in my class?
- What other courses are my students taking? Do they include honors classes or remedial classes? Art or music?
- What kinds of extracurricular activities are students participating in?
- How does the attendance in my class compare with the attendance in other teachers' classes? Have any students had recent problems with absences?
- Which students are new to this school? What school or district did they come from? Have they moved around a lot? Is there a correlation between transience and performance?
- How do students' grades in my class compare with their grades in other courses?
- What does assessment data show about these students' past performance?

The flexibility and agility of the District Data Analyzer result in up-to-date responses to questions such as these. Daily feedback with reliable information becomes the norm.

With useful information in hand, educators can take steps to improve student achievement. For example, teachers might begin to make instruction more relevant to the background, experience, and interests of their students; administrators might pinpoint areas that merit more attention in teacher professional development.

Reports take a fraction of the time to produce using the DDA.

3.3 Reporting

Reporting has become a significant and time-consuming task for educators, whether in response to federal or state mandates or as part of outreach efforts to parents and community. Schools, districts, and states must produce compliance reports and other documents in a regular, never-ending cycle. Concerns about such high-stakes matters as having highly qualified teachers and making Adequate Yearly Progress consume educators' attention; and the need for accurate, timely reporting adds to the pressure.

The District Data Analyzer simplifies the reporting process. Data obtained through the DDA's easily customizable user interface can be exported to PDF files, Word documents, Excel spreadsheets, or other formats. Reports that present information in easily understandable tables, charts, or graphs can be produced in a fraction of the time.

3.4 Better Use of Resources

The simple but powerful technology behind the District Data Analyzer frees up resources across the education organization. Time and personnel no longer need to be devoted to entering data, scrubbing data, building data cubes, and performing other tasks associated with a traditional data warehouse. Teachers and administrators can get answers to questions in seconds rather than days, freeing up more time for meeting student needs. Time and attention spent on producing reports can be devoted to other tasks. The bottom line: a more efficient, cost-effective organization.

Natrona County School District in Wyoming is using the District Data Analyzer to help it comply with state requirements related to student achievement. Rather than rely on high-stakes tests, Wyoming requires school districts to develop a Body of Evidence (BOE) system that reflects what a student knows and is able to do in up to nine content areas. The system must meet certain criteria, such as *alignment* with standards; *consistency* in terms of minimal error attributable to differences in raters, tasks, and testing conditions; *fairness* in terms of nonbiased treatment of any particular subgroup of students; and *comparability* across schools and classrooms within a district, and both within a given year and across years.

Meeting the BOE requirements under these criteria is a complicated task, involving analysis of large amounts of data. Mark Mathern, executive director of curriculum and instruction for the Natrona County School District, sees the District Data Analyzer as a "honing device that can help us tell if our efforts to align, be fair, be consistent in our judgment, and be comparable across classrooms need some adjustment." Mathern appreciates the DDA's ability to develop on-the-fly reports and just-in-time reports. "We can add data from teacher desktops every day, and the reports generated from the DDA will reflect those additional data points," he notes. "Other systems require regular uploads into a static warehouse, thus making it extremely expensive."

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4.0 Excelsior Software: The Company Behind the DDA

Excelsior Software's reputation as a leader in the education software industry is confirmed by ASCD's endorsement of Pinnacle Plus and by the company's association with Robert Marzano.

Since its formation in 1986, Excelsior Software has been a leader in the field of assessment management software. Excelsior is perhaps best known as a pioneer in electronic gradebooks. Its assessment management tools are used in nearly 1,000 districts nationwide, and its Pinnacle Plus System is the only student assessment software product endorsed by the Association for Supervision and Curriculum Development (ASCD). Since 2001, Excelsior has collaborated with the distinguished education researcher and author Robert Marzano to incorporate many of his methodologies and philosophies into Pinnacle Plus. In 2006 Pinnacle Plus won the prestigious CoDIE award in the category of Best Student Information System or Gradebook.

With the District Data Analyzer, Excelsior has moved into the data analysis field with the same commitment and dedication to quality performance that has characterized its achievements in Pinnacle Plus. The DDA was a finalist in the 2006 CoDIE award category of Best Solution for Education Enterprise. Customer satisfaction in the nearly 30 school systems currently using the DDA is approaching 100 percent.

[Jeanette: How do you measure customer satisfaction? Without some indication, this kind of statement (which I picked up from the focus group presentation) could be challenged.]

The DDA connects seamlessly with Pinnacle Plus or can be used as a standalone product.

The DDA complements Pinnacle Plus and can be used to extend its functionality. Data from Pinnacle Plus, like data from other ODBC-compliant data sources, can be seamlessly accessed through the DDA. The DDA can also operate as a standalone application for clients that do not use Pinnacle Plus.

Excelsior's solid track record with its Pinnacle System is contributing to the confidence its clients have in the DDA. Chris Lindberg, manager of data, research, and testing for the Bellevue School District notes that the district's good working relationship with Excelsior through its use of the Pinnacle gradebook led to the decision to purchase the DDA. Bellevue has not been disappointed, Lindberg reports. Eighteen months after purchase, Lindberg says he is "far more impressed with DDA's capabilities and potential now than when first introduced to the product. DDA has grown along with us, as we continually expand our ideas of how data and technology can be put to work, furthering our goal of ensuring success for all our students."