



# Using Jaspersoft Analytics:

## Comparing In-Memory and OLAP Analysis capabilities

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## Executive Summary

Analytics is one of the most critical components of any business intelligence (BI) portfolio. With the continued growth of the BI market, covering a broader set of users and company sizes, there has been an increase in the number of ways users can analyze data. Knowing which analysis model best fits a particular analytic need or user profile is key to establishing a successful BI deployment.

The Jaspersoft Business Intelligence Suite offers a number of ways for end users to perform interactive analysis. For the most casual user, this might involve simply changing a filter setting on a report to view a different slice of data. For a data analyst this could mean writing powerful, multi-dimensional expressions.

The two primary tools dedicated to analysis within the Jaspersoft suite are JasperAnalysis and the integrated In-Memory Analysis tool within JasperServer. JasperAnalysis is a traditional OLAP (Online Analytical Processing) tool, based on the popular open source Mondrian engine. Jaspersoft, its partners, and customer community have contributed a number of updates to the Mondrian project over the years to make it one of the worlds most popular OLAP engines. OLAP tools perform analytic tasks on specialized, analysis-tuned data collections commonly called “cubes.” The integrated In-Memory Analysis tool enables more straightforward ad-hoc query, reporting and analysis operations.

To help Jaspersoft customers determine which approach best fits their needs, this report provides an overview of both tools, then discusses the primary user and organizational profiles best suited to each. In the final section, we provide a more detailed feature comparison.

This paper is designed to act as a guideline and overview for customers evaluating Jaspersoft’s technologies. For an overview and definitions the general analytics marketplace, including surrounding technologies such as databases, middleware, and presentation layers, check out [The Analytics Landscape](#). Using Jaspersoft Analytics is summarized to provide a generic overview and should not be seen as a substitute for a discussion with a Jaspersoft representative, who can also take into account the specifics of an organization’s particular needs.

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## Jaspersoft Analysis Products

In this section, we describe the high-level features and functions of JasperAnalysis and the integrated In-Memory Analysis tool in JasperServer.

### JasperAnalysis: OLAP-based analysis.

JasperAnalysis is a Web-based OLAP product. Its ROLAP (Relational OLAP) engine leverages a rich, multidimensional metadata model to directly access analytically ready relational data stores such as data marts and data warehouses.

JasperAnalysis can be used to explore data to discover root causes, spot trends and patterns, identify anomalies, and visualize correlations by allowing users to dynamically slice and dice, pivot, filter, chart, and drill down (explore details) or roll up (summarize details) a cube of data in real time.

Figure 1 shows a sample JasperAnalysis report featuring a chart and drillable pivot table.

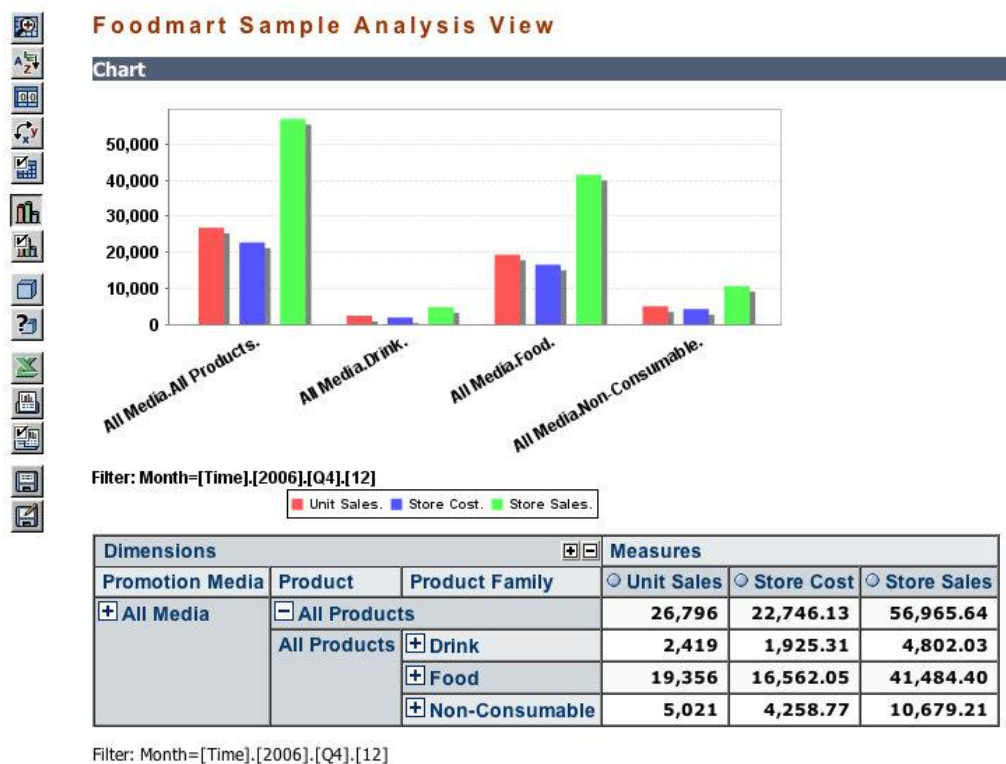


Figure 1. A Sample JasperAnalysis Analytic Report

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The product is compliant with the industry's de facto OLAP standards. It supports MDX (the SQL-style OLAP query language also called Multi-Dimensional Expressions), as well as XML for Analysis (XML/A), the SOAP-based API that standardizes access to an OLAP source from a Web-based client. MDX queries can also be used directly in iReport, Jaspersoft's report design tool, to build on-demand or scheduled reports as well as dashboards.

JasperAnalysis has a number of advanced features, including built-in aggregate awareness to speed performance against large data volumes, and the ability to drill through to transactions to uncover the details underlying a trend.

The product also comes with an optional module—Jaspersoft ODBO Connect—that allows users to employ Microsoft Excel as a front-end client. This module enables Microsoft Excel 2003 and 2007 pivot tables to work with JasperAnalysis and other OLAP servers that support XML/A, such as Microsoft SQL Server Analysis Services and Mondrian. Figure 2 shows an Excel spreadsheet connected to the JasperAnalysis ROLAP server.

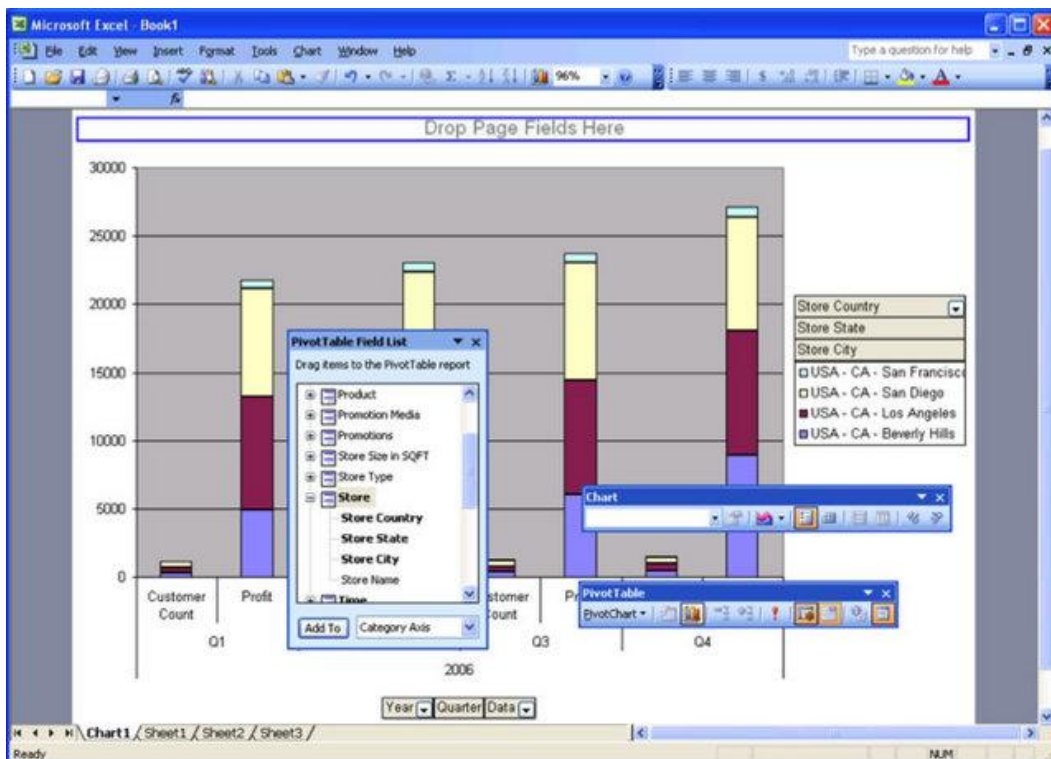


Figure 2. ODBO Connect Enables Excel as the Front End to the JasperAnalysis Engine

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## JasperServer Integrated In-Memory Analysis

JasperServer provides an integrated suite of BI capabilities, including ad-hoc query and reporting, dashboarding and analysis. All capabilities are delivered based on a common metadata and security layer and are delivered via the same Web 2.0-style user interface.

To create a query, users simply drag and drop data objects of interest from a business view of the data into a query builder window, with the option to add filters and parameter groups. The query results can then be laid out and formatted to produce a report that can be saved, shared, scheduled and distributed through the JasperServer platform.

Dashboards, including features like URL-based mashups and live refresh, can also be created through the same drag-and-drop interface. Flash charts and maps enhance the look and interactivity of the dashboards. Figure 3 shows an example of a dashboard with some of these features.

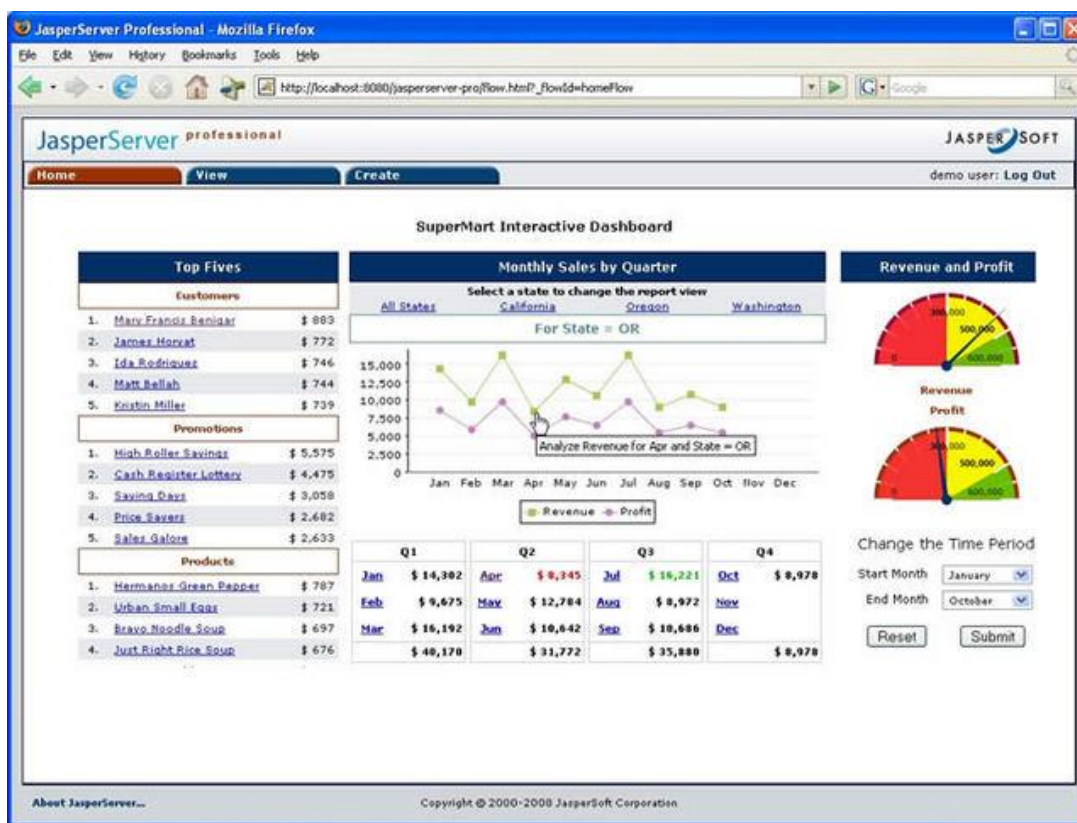


Figure 3. A Sample Dashboard with Embedded Flash Charts

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The integrated In-Memory Analysis tool takes advantage of “in-memory” techniques through the same Web-based ad hoc user interface. As shown in Figure 4, the traditional analysis functions of pivot, drill, slice and dice, sort and filter are available through the tool.

As the name suggests, there are key difference between the traditional, cube-based BI model and an in-memory one. In the former queries are run against data on disk; in the latter, queries run directly against data in random access memory (RAM), resulting in a significant performance improvement. The in-memory approach benefits both business and IT. Business users can engage in self-service, speed-of-thought analysis, while IT is relieved of the need to spend time on query analysis, cube building, aggregate table design and other time-consuming performance enhancement tasks.

JasperServer’s in-memory analysis capability requires no back-end data warehouse, data mart or OLAP cube to deliver useful analyses. Though the technology can work with these types of sources, it can also operate directly on normalized online transaction processing (OLTP) databases, as well as non-relational data sources. Although queries are typically processed in memory, the tool also offers the option to push them down to the database level, which may be appropriate with analytically focused database platforms (e.g., columnar databases).



Figure 4. The JasperServer in-memory analysis capabilities

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### Matching User Profiles to Jaspersoft Analysis Products

Now that we have described both products, we'll look at the two primary analytically focused business user profiles and identify which product best satisfies their particular needs.

#### **Business analysts benefit from the power of JasperAnalysis**

Business analysts sit at the intersection of data, process and strategy, and play a significant role in helping the business solve problems, devise plans and find opportunities. Their titles include “business analyst,” “financial analyst,” “marketing specialist” and “operations research analyst.” They are most commonly found in the Finance, Sales Operations, Marketing and Services/Support departments.

To identify the analytics model that best suits the needs of business analysts, we detail their analysis profile below:

- Often trained in standard analytic methodologies and tools, these analysts are typically very comfortable with the OLAP analysis model.
- Business analysts spend a considerable amount of their time analyzing data. To succeed, they need the powerful tools suitable for a broad range of analytic tasks. Because of the importance of these tools to their jobs, business analysts are willing to invest the sometimes-considerable time required to learn and master them.
- Excel is a favorite of business analysts who use it regularly to capture, manipulate and present small sets of data.
- Because of the importance of the data-related work analysts do, organizations are willing to make the investment necessary in building the data warehouse, data marts and OLAP cubes to support their activities.

Based on this profile, JasperAnalysis presents itself as the ideal tool to address their needs. Specifically:

- JasperAnalysis is a relational OLAP product leveraging the familiar pivot-based OLAP model from an intuitive, Web-based user interface that supports the de facto OLAP industry standards of MDX and XML/A.
- In addition to the standard pivot, sort and drill capabilities, JasperAnalysis gives analysts the full power of MDX, which satisfies the complete spectrum of their analytic needs.

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- Analysts who prefer to use Microsoft Excel as a front-end client can use the Jaspersoft ODBO Connect module to link Microsoft Excel to the JasperAnalysis ROLAP engine.
- JasperAnalysis performs best with a data warehouse or data mart as its back end. IT can build virtual cubes on top of these data stores to enable analysis in the tool.

### **Super users benefit from the flexibility of the integrated In-Memory Analysis tool**

Super users are typically technically savvy business users who take responsibility for creating reports on behalf of colleagues in their departments. In most cases, they are self-appointed volunteers who work with IT to handle the primary BI tasks for their team.

To identify the product that best suits the needs of super users, we detail their analysis profile below:

- Unlike business analysts, super users don't see data analysis as their primary goal. They may do some analysis as part of the services they offer, but their main interest is in producing reports and dashboards useful to their team.
- Of primary importance to this audience, however, is having a full suite of core BI functionality (ad hoc query, reporting, analysis and dashboarding) readily available.
- Although fairly technically savvy, super users are not typically trained in analytic methodologies, and prefer ease-of-use over sophistication in BI tools. This typically results in more data exploration where measures are not defined up front, allowing the tool to guide the user to their destination.
- As super users often operate semi-independently of IT, it is important that they be able to set up their environment with minimal need for IT resources.

Based on this profile, JasperServer's integrated In-Memory Analysis tool is well suited to the needs of the super user. Specifically:

- JasperServer provides fully integrated ad hoc query, reporting, analysis and dashboarding. This allows super users to run their own queries, perform analysis where necessary, and produce the reports and dashboards needed by their team, all from a single interface and metadata layer.

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- Leveraging the latest AJAX and Flash technology, JasperServer presents a highly intuitive user interface. All capabilities are available from the same product, making it easy for users to quickly go all the way from data to dashboard. There are no requirements for training in analytic methods or knowledge of MDX in order to benefit from its analysis features.
- Data warehouses, data marts or OLAP servers are not needed to perform analysis in JasperServer. Because analysis is done in memory, any relational or even non-relational source can be analyzed. This makes it easy for a “light IT” group or the super users themselves to set up the environment.

## Matching Organizational Profiles to Jaspersoft Analysis Products

Another way to consider how to identify which analysis product best fits a set of needs is to look at the organizational profile. Below, we identify three organizational profiles and match the products to their needs.

### **Integrated In-Memory Analysis for SMB and enterprise departments**

Small to medium-sized businesses, and departments in large enterprises, often share similar characteristics in terms of their business intelligence environments. Specifically:

- They lack a large, expert IT staff available to help set up and deploy business intelligence solutions. An enterprise may have a corporate Business Intelligence IT group, but many departments still need additional BI capabilities in order to respond to the particular needs of their users.
- The smaller the organization, the less likely it is to have a full-fledged data warehouse. In some cases, data marts may be available for certain functional needs. However, most, if not all, of the data needed for analysis can be found in operational data stores.
- The vast majority of analytically focused users are super users who require an easy-to-use, integrated query, reporting and analysis solution in order to produce reports and dashboards for their team.

JasperServer is a good fit for this organizational type because:

- The analysis capabilities in JasperServer require little IT investment to set up and deploy. There is no need to establish a data mart or data warehouse or to build

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OLAP cubes. The only requirement is to define the metadata layer that will be used to access the data sources, making it easy for a light IT organization or power users themselves to set up the environment.

- As analysis in JasperServer's Ad Hoc tool is done in memory, there is no requirement to have an analytically optimized data store (such as a data mart or OLAP cube) to ensure acceptable levels of performance. High-speed analysis can be performed directly against operational data stores, which can be relational or non-relational in nature.
- JasperServer provides all the key analytic capabilities—querying, reporting, and dashboarding—through a single, easy-to-use, Web-based user interface.

Although the in-memory analysis capabilities of JasperServer are usually sufficient for the organization type described here, JasperAnalysis may also be required, especially if business analysts involved prefer working with an Excel front end, or if query complexity requires the power of MDX. (A more detailed description of the MDX-based capabilities of JasperAnalysis can be found in the last section.)

## JasperServer provides integrated analysis for ISVs

Jaspersoft is a leading provider of business intelligence capabilities to Independent Software Vendors (ISVs) looking to embed analytics into their offerings. Although the analytic requirements of these ISVs are dependent on the specific needs of their customer base, they typically have the following characteristics:

- Business intelligence plays a supporting role in the ISV's offering; the main focus is usually on facilitating a specific operational process. As such, vendors don't want to invest in building dedicated, back-end data warehouses or data marts; instead, they want analytic tools to work directly against transactional databases (or a copy).
- ISVs may have a proprietary, non-relational data source for which they need to provide analysis capabilities.
- On the assumption that their customers are not advanced analytic users, most ISVs emphasize ease-of-use over sophistication in providing BI capabilities as part of their offering.
- When end users are likely to want or need data analysis capabilities, ISVs prefer to tightly integrate them any other BI functionality such as ad hoc query or reporting.

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Based on these needs, JasperServer presents itself as the ideal product for the following reasons:

- JasperServer's In-Memory Analysis capability requires no data mart or data warehouse to deliver speed-of-thought performance. JasperServer can be pointed directly at an operational data store.
- In-Memory Analysis is available for both relational and non-relational data stores.
- JasperServer is built on a highly intuitive, AJAX-based user interface that makes it very easy for a broad user population to interact with the back-end data.
- In-Memory Analysis in JasperServer is seamlessly integrated with the reporting, ad hoc query and dashboarding features of the suite; all of these capabilities are available to the end user through a single interface.

Exceptions do occasionally apply. If, for example, an ISV wants to provide sophisticated, MDX-based ad hoc analysis capabilities to end users, JasperAnalysis would be required. Examples of MDX-based features can be found in the last section.

### **The power and flexibility of JasperServer and JasperAnalysis for enterprises**

Enterprise business intelligence deployments need to cover the full spectrum of analytic needs for a broad set of users, and typically have the following characteristics:

- As mature business intelligence organizations, Enterprises generally have a central data warehouse and/or one or more functional data marts.
- Data volumes are significant, often reaching many terabytes in size, and usually reside in both relational and legacy, non-relational sources.
- One or more business analysts are dedicated to information analysis. Also, at the department level, super users need analysis capabilities as part of an integrated business intelligence suite.
- A large, expert IT staff provides BI services, and may have a BI competency center that develops and guides best practices.

It makes sense to deploy both JasperServer and JasperAnalysis to address the wide spectrum of needs of these organizations. Specifically:

- Business analysts will benefit from the power and flexibility of JasperAnalysis. Corporate IT staff can take the time to build OLAP cubes in support of

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JasperAnalysis; these can be deployed on top of the data warehouse and/or functional data marts. JasperAnalysis's powerful ROLAP engine can also handle the large data volumes typical in this type of environment.

- JasperServer provides the integrated query, reporting, dashboarding and analysis capabilities required by super users. In-Memory Analysis capability can also be used directly against non-relational data stores such as those found in certain legacy systems.

### Differences between JasperServer In-Memory Analysis and JasperAnalysis

This section provides a checklist review of the main technical differences between the analysis capabilities of JasperServer and JasperAnalysis. The table below contains some of the primary differences at a feature level:

Area	Capability	JasperServer	JasperAnalysis
<b>Interface</b>	Native Excel front end through ODBO	No	Yes, with ODBO Connect option
<b>Integration</b>	Integrated with ad hoc reporting	Yes	No
	Integrated with dashboards	Yes	On product roadmap
<b>Data Sources</b>	Normalized OLTP schema	Yes	Not recommended
	Non-relational sources	Yes	No
<b>Expressiveness</b>	Leverages aggregates	On product roadmap	Yes
	Supports MDX*	On product roadmap	Yes
	Built-in ROLAP server	On product roadmap	Yes
	Drill-through to underlying transactions	On product roadmap	Yes
<b>Scalability</b>	Data volumes	Large	Very large
	Support for	High	Very high

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	concurrent users		
<b>Metadata</b>	Hierarchies	No, but can be defined at report level	Yes
	Shared with reporting and dashboards metadata	Yes	No
<b>Setup and Maintenance Effort</b>	Requires a data warehouse or data mart	No	Recommended but not required
	Cube maintenance	No	Yes

\* Certain analytical functions, available out-of-the-box in JasperAnalysis, require significant effort to replicate in the SQL-based JasperServer. Examples include:

- Parallel period analysis: comparing one time period with another time period of equal duration (e.g. comparing sales from 2007 to sales of 2005)
- Prior period analysis: comparing one time period with the prior time period of equal duration (e.g. comparing sales of Q2 2009 with Q1 of 2009)
- Asymmetric analysis: comparing one time period with another time period of non-equal duration (e.g. comparing sales of 2009 with Q1 of 2008)
- Statistical analyses such as linear regression and standard deviation
- Ranking and filtering by hierarchy
- Conditional calculations: for example, a moving average that takes into account the current level in a hierarchy (average over year or quarter or month)
- Complex charting that can take into account multiple groupings

## Conclusion

Analyzing data accurately is at the heart of business intelligence. Providing appropriate analysis tools for the needs of a particular user or organization plays an important role in delivering on the promise of BI.

Jaspersoft offers a suite of analysis capabilities covering a broad range of user and organizational profiles, delivered chiefly within JasperAnalysis and in the integrated In-Memory Analysis tool within JasperServer. Using the guidelines provided herein,

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organizations can choose one or both of these tools to meet their analysis needs and help ensure a successful BI deployment.

## Comments?

We would be pleased if you could share your thoughts and questions. Please send comments and questions to [analytics@jaspersoft.com](mailto:analytics@jaspersoft.com), and a Jaspersoft representative will follow-up with you.

## About Jaspersoft

Jaspersoft provides the most flexible, cost effective and widely deployed Business Intelligence suite in the world, enabling better decision making through highly interactive, web-based reports, dashboards and analysis. Leveraging a commercial open source business model, Jaspersoft provides end-to-end BI capabilities at a fraction of the cost of other vendors. The BI suite includes pixel-perfect enterprise reporting, ad hoc query, dashboards, OLAP and in-memory analysis, and data integration. Jaspersoft is the only BI vendor that enables companies to adapt to the new, virtualized world by providing a complete spectrum of on-premise, multi-tenant SaaS and cloud-based deployment options for both embedded and standalone business intelligence. Unlike traditional BI vendors, Jaspersoft is built on a modern, light-weight, standards-based architecture and offers greater vendor independence thanks to its open source codebase. Unlike niche BI vendors, Jaspersoft represents a safe choice with tens of thousands of production deployments across a wide range of industries.

Jaspersoft's open source business intelligence software has more than 11 million product downloads worldwide, 160,000 production deployments in 100 countries and over 13,000 commercial customers. Its BI suite is advanced regularly by a development community of more than 150,000 registered members. For more information visit: [www.jaspersoft.com](http://www.jaspersoft.com) and [www.jasperforge.org](http://www.jasperforge.org).

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