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“Take the analysis to the data, not data to the analysis.”

Pneuron Corporation offers a unique solution that finally addresses the traditional problems associated with disparate and distributed data, systems, business processes, and analytics across an organization. Pneuron’s patent pending Distributed Analytics solution is specifically designed to achieve a completely distributed approach that combines data and analytics at the source, all while respecting enterprise security, performance standards, and integrity of results.

Pneuron’s simple to deploy processing framework provides organizations with the ability to easily configure solutions which target specific data, and applies rules, workflows and analytics all from one central source. Pneuron achieves this by distributing functions across the existing infrastructure for maximum performance and resiliency, while preserving a robust and extendable suite of definitions.

Pneuron is uniquely designed to help organizations overcome the data and systems fragmentation so common in today’s enterprises and react quickly to the challenges and opportunities that drive their organization’s success: compliance with new and evolving regulations, integration of new or inherited systems often obtained through mergers and acquisitions, reduction of resource or system costs across the organization, and development of new products and services to improve top-line growth and competitiveness in the market.

In short, Pneuron combines data acquisition, matching, rules, applications, models, analytics, processing and any other function together, and then distributes them seamlessly across the enterprise using existing application, network, and hardware assets. The result is that applications, solutions or even entire operating models can be designed, developed and deployed at a fraction of the cost and time of anything that has come before.
What is Pneuron Distributed Analytics Solving?

Fragmentation of data and systems limits organizations in their ability to understand customers, opportunities, and risks. Organized by function, line of business or geography, the modern enterprise has numerous compartmentalized systems that are purpose-built and specialized, but inflexible in their functional evolution or incompatible with other critical systems.

These organizations often invest in expensive projects to leverage and correlate complex and diverse data across these systems. This process typically involves the procurement of large central databases, middleware, ETL and data modeling projects, or potentially the wholesale replacement of existing point solutions. Unfortunately, these projects yield marginal results. This traditional approach is extremely inefficient in terms of both Total Cost of Ownership (TCO) and Return on Investment (ROI). They often institutionalize poor quality, inflexibility, lack of value, incompatibility, and unnecessary risk. Too often, important data remains in departmental or application-based silos, preventing access to and sharing of information that should be used to make real time decisions.

Pneuron has completely shifted the traditional approach taken by current Business Intelligence (BI) or business application development, deployment, and maintenance projects.

The Pneuron solution allows organizations to move away from the traditional and costly requirements for data centralization, normalization, and the imposition of multiple foreign, abstract and incompatible data models, all of which result in 70 cents on the dollar spent in preparation for the creation of value, rather than actually creating it.

In fact, the Pneuron solution allows organizations to move away from the traditional and costly requirements for data centralization, normalization, and the imposition of multiple foreign, abstract and incompatible data models, all of which result in 70 cents on the dollar spent in preparation for the creation of value, rather than actually creating it.

The Pneuron solution offers a ground-breaking technology that accelerates the creation, deployment and management of data, analytics, and operational best practices, allowing organizations to achieve critical, real time connection of their global enterprise at a fraction of the cost of alternative solutions.
Business and Technology Benefits

- Intelligence, awareness and visibility are achieved by connecting data and information, both internal and external to the organization, without intermediary databases, data models or transformation requirements. As a result, TCO for projects is around 50% of current approaches.

- Faster and less expensive product development cycles, legacy system revitalization, and development of new operating models by integrating multiple technology disciplines into a single, non-intrusive network for a simple report right through to an entire operating model.

- Seamless distribution of best practices and common standards, which creates maximum leverage and accelerates operational excellence initiatives.

- Improved targeting of products and services that result from a robust, integrated view of the customer, risk and operations.

- Ability to add new functions, workflows, solutions and applications quickly, seamlessly and continuously, maximizing ROI and business agility.

Deployment

- Project business cases are no longer considered large-dollar ticket items; rather, they are small, incremental, controlled, interconnected, and linked directly to clear measurable successes.

- Seamlessly blend any number of legacy applications, processes and data sources in order to extend the value of existing infrastructure, applications, and tools.

- A common, simple and clear deployment approach gives Business and IT the ability to gain critical consensus, resulting in unprecedented combined organizational leverage.
The primary vendors involved in business intelligence (BI) and data acquisition focus on a model that requires detailed evaluation of all systems, implementation of extraction, transformation, loading programs, acquisition of all enterprise information, and mapping and normalization of data into an aggregated data warehouse.

Most organizations also adopt this model as the *de facto* standard when building internal systems to aggregate institutionalizing significant inefficiency and cost.

The following illustration provides an overview of the data acquisition continuum. Note the significant requirements for up-front design and build of large infrastructures in the traditional approach (far left) versus the characteristics of a dynamic environment (far right).

### Traditional Approach

- **BI, Current Enterprise Application, DB and ETL solutions**
  - Central database, data-model and normalization design
  - Expensive to design and implement and manage
  - High cost and risk of ownership
  - Delayed visibility
  - Programmatic instructions
  - Performance bottlenecks
  - Costly, time consuming, opacity in project risk

- **Data or Data Model Virtualization**
  - Distribution of all or components of logical data model into virtualized structure
  - Inability to link business functions in simple to connect, seamless virtualized environment
  - Still looks at data as an end point rather than beginning of a business solution

### Pneuron's Approach

- **Persist selective source information and intelligence results**
  - Maintain cross references and reference data
  - Accumulate intelligence data for trending and subsequent action
  - Integration and normalization at source and aligned for "prescribed" business problems

- **Real-time acquisition, evaluation and actionable intelligence**
  - Abstract and configure disparate data sources using meta-data
  - Provide a unified interface for viewing all the data within an organization
  - Linked Meta Data is connected to a variety of back-end data sources using different protocols, including JDBC, web services, and direct file access
  - Combine the results across multiple source systems using data federation services
  - Publish the results to participating Pneurons using self-describing XML
  - Enable loose coupling between the data and a unified Pneuron query interface to access native system data in real time across distributed Pneuron instances
Traditional data aggregation has several challenges:

- Extensive requirements gathering at the data level, including design time and normalization effort.
- Requirements for foreign and abstract data model impose a standardized data discipline across the enterprise. This is inflexible, expensive, and rarely delivers on promised business results.
- High IT infrastructure, maintenance, and business support costs.
- Inflexibility and a lack of agility including significant time and effort for adjustments.
- Time delays in results, with data that is often already dated during the analysis process.
- Poor TCO and ROI when aligned to business objectives.

The Pneuron model offers a new approach to enterprise transparency, intelligence creation and competitive decision making with a complete reshaping of both the Total Cost of Ownership (TCO) and business case Return on Investment (ROI) challenges that hinder enterprise competitiveness, transparency and agility:

- Interoperable with existing data sources, applications, messaging platforms and analytics solutions, and enabling rapid, cost effective business solution or operating model creation in a single high performance platform. The platform is non-intrusive, uniform across all components and distributed, removing the need for centralization or normalization requirements.
- No foreign or abstract data model dependency, with full leverage of existing BI investments and Intellectual Property (IP).
- No intermediary technology bottlenecks – ETL scripts, SOA infrastructure, databases or marts.
- The database becomes a repository of results and solutions rather than a slow and expensive source for raw enterprise data.
- Agile, real-time, and cost effective deployment and ongoing maintenance.

With the Pneuron approach, applications and intelligence systems retain their direct connection to source systems, improving the speed, cost, and quality of subsequent processing.
The Pneuron Distributed Platform Summary

Pneuron’s Distributed Platform™ operates similarly to how the neurons in the human brain function, with each “Pneuron” serving as part of a network of other connected Pneurons to retrieve, analyze, derive and deliver intelligence.
Pneurons™
Pneurons are distributed, lightweight, fixed-function, interoperable processing components positioned or individual source systems, creating a powerful processing network that sidesteps today’s time and cost penalties.

Pneuron Design Studio™
The Pneuron Design Studio enables design, development, integration, deployment, and management from a single visual and intuitive user interface.

Pneuron Cortex™
The Pneuron Cortex encapsulates multiple technologies into a lightweight, dynamic run-time server that provides six sigma level scale, availability, clustering and resiliency while re-using existing infrastructure or accessing remote capacity.

Visualization
Pneuron’s comprehensive intelligence visualization suite of tools provide interactive ability to perform what-if analysis and recast results instantaneously.

Pneurons can act alone as independent functions or services, be overlaid on top of existing applications or data, and encapsulate or wrap existing functions or applications. Critically, all Pneurons are uniformly interoperable and so can be connected in real time to other Pneurons, thus creating new products, workflows, or new operating models of any complexity from a single integrated user environment.
Unlike conventional data acquisition in enterprise applications that require normalized data for efficient retrieval and processing, Pneuron enables the creation of globally distributed data access networks that do not require normalized data, nor the movement of data from source systems. These data acquisition networks can be a single query Pneuron or a complex sub network constructed with data from any number of completely different data sources using a Matching Pneuron, thereby creating a virtual relationship between the two databases in real time.

Data acquisition is organized by type, including database, application programming interface (API) or service interaction, document, or file type. Specialized Pneurons are implemented for each data acquisition type in order to assist clients with easily configured access, regardless of source type; e.g. DB, Service, File, Document, Streaming Pneuron.
**Example data interaction Pneurons**

<table>
<thead>
<tr>
<th>Pneuron</th>
<th>Functionality</th>
<th>Integration Technology</th>
<th>Target Class &amp; Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Query</td>
<td>Retrieves specified content from relational databases</td>
<td>JDBC</td>
<td>Relational Database</td>
</tr>
<tr>
<td>Document</td>
<td>Retrieves files with the specified content</td>
<td>Lucene Indexing</td>
<td>File Directories</td>
</tr>
<tr>
<td>File</td>
<td>Used to access a file and retrieve specific contents for further processing</td>
<td>File Parsers</td>
<td>Semi-structured Files</td>
</tr>
<tr>
<td>Service</td>
<td>Enables connections to Web Services or applications via defined SOA or API</td>
<td>Web Services / Application API</td>
<td>3rd Party App w/API</td>
</tr>
<tr>
<td>Wrapper</td>
<td>Allows encapsulation of existing java libraries, classes and methods</td>
<td>Java Reflection</td>
<td>3rd Party App w/Web Svcs</td>
</tr>
<tr>
<td>Custom</td>
<td>Allows encapsulation and integration of other application types</td>
<td>Java reflection introspects program methods and parameters</td>
<td>Enterprise Service Bus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C#</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Others</td>
</tr>
</tbody>
</table>

Pneuron data access Pneurons are visually configured to gather and process data as a scheduled operation or stimulated by an event, based on client preference or business process. They can easily be modified to include additional data sources to strengthen existing queries. Pneuron data networks, which are created in Design Studio™, provide a flexible and efficient approach to add, modify or delete sources or attributes. In addition to acquiring information, the Pneurons can selectively update records within target systems with evaluated information, enabling synchronization of information where necessary.

Finally, the complexity associated with most traditional acquisitions in enterprise applications can be daunting, often requiring an organization to construct and run complex queries with multiple levels of nesting in real time or scheduled mode on a centralized database or warehouse. This increases the cost and time of execution and is inefficient as the dataset inevitably grows larger. The Pneuron data access and acquisition model provides greater flexibility by breaking down complex queries into smaller queries that can be triggered at individual sources in real-time or scheduled mode, thereby massively decreasing the cost and time of execution.

These, among other features of the Pneuron system, are in direct contrast to traditional systems that obtain, aggregate, normalize, and optimize data before any value can be created.

**What if you want to persist data?**

No problem. Pneuron supports all databases, appliances and data-mart deployments. What Pneuron uniquely does is remove the need to have these data constructs and associated MDM, ETL or data model requirements. Pneuron encourages clients to use databases. They are however, no longer at the front of the value creation process. No longer a prerequisite for value, and a bottleneck of raw data that needs to be structured and optimized before value is created. Instead the database has been moved to the back of the business value process and is now a repository of successful results and supporting information – both a destination and a source for more analysis.
Analysis Pneurons

Define, configure, or import rules, simple and complex predictive models, even entire analytics applications or any other IP. Seamlessly and quickly integrate functions normally separate both from each other and from the data sources they require. In Pneuron they are uniformly interoperable, consistent in security and performance no matter how deployed, fully distributed without the need for precursor data-models, databases or marts, and real time.

Pneuron’s unique model streamlines the enterprise intelligence definition, creation, deployment and management process, while providing a comprehensive suite of data acquisition, matching, rules, and analytics linked together. These definitions can be replicated for expedited creation of similar Pneuron processes across disparate business units within an organization, preserved in a global library for use across the enterprise, or exported into different Pneuron instances to create focused products for an organization’s clients.

MATCHING PNEURON

The Matching Pneuron is configured within the Pneuron Network and is applied against acquired information to perform different matching algorithms and weighting sequences across one or multiple systems.

The Matching Pneuron enables custom rules, confidence levels, and sequencing. By combining the matching process with the acquired multi-system information, the Pneuron solution is able to evaluate and align records based on the criteria configured in real-time.

The Matching Pneuron integrates multiple sources of data and applies multiple matching algorithms based on confidence levels. The result is the highest level of accuracy to link, reconcile and unify record sets and identification patterns across any number of data sources.
The Analytics Pneuron enables users to define complete analytical models, varying from simple to highly complex. Also, third-party analysis (SAS, TIBCO Spotfire, Matchlab, Cognos, Tableau etc) can be simply imported directly into the Analytics Pneuron, enabling world-class analysis to be seamlessly integrated with Pneuron’s world-class distribution and deployment model. The same can be said for any proprietary analytical construct including spreadsheet-based approaches.

Use the champion-challenger approach to enable fine-tuning and automated application of the best analytical results as well as real time delta analysis between different analytical approaches.

Champion-challenger models can be applied by configuring the Pneuron Network to evaluate multiple Analytical Pneurons, with one being identified as the Champion and the secondary Analytical Pneurons as the Challengers. This approach enables fine-tuning and automated application of the best analytical results as well as real time delta analysis between different analytical approaches that are being used for reviewing the same business problem.
RULES PNEURON

The Rules Pneuron integrates the Drools® runtime rules engine. Drools® is considered one of the most capable rules engines available today. Users have the option of configuring their own rules within the Rules Pneuron or importing existing rules definitions from third party rules systems using the RuleML® standard. Once again, this Pneuron is fully interoperable with every other Pneuron no matter what function is within it.

PREDICTIVE MODEL PNEURON

The Predictive Model Pneuron enables the import of third party Predictive Model Markup Language (PMML®) standard files, run time statistics engines as well as the direct import and conversion of native SAS programs into Pneuron.
Pneuron has implemented a suite of Rich Internet Architecture (RIA) applications using the Google Web Toolkit (GWT) and Smart Client. The applications are thin client, requiring no client applications to be installed on the client computers.

All results from all Pneurons and Pneuron Networks can be distributed directly to other Pneurons for further analysis within the network, published to target internal or external applications (either directly through API Pneuron, or Heads Up Display), passed to mobile apps, visualization tools or any other selected endpoint or distributed directly to Pneuron’s Enterprise Control Manager or mobile apps.

Pneuron Graphical User Interface

Heads Up Display (H.U.D.): Function Overlay

- Floating real-time “Java launch-pad” for information visualization widgets integrated with any legacy or third-party application.
- Provide incremental information, data from other systems, analysis, third-party or workflow information.

Enterprise Control Manager (ECM): Products, Reports, Solutions

- A comprehensive intelligence visualization suite of tools with interactive ability to perform what-ifs and recast results instantaneously.
- Business user and subject matter expert easy-to-use graphical toolsets enabling configuration specific to each business with minimal programming and customization.

Pneuron results and intelligence can be integrated with any existing BI tool, mobile endpoint or application.
Conclusion

The Pneuron solution was developed with a single uncompromising guiding principle – eliminate the historic technological barriers that prevent organizations from functioning as a cohesive, transparent enterprise.

Pneuron’s technology design delivers on this promise by removing the traditional demands and costs associated with bringing data, analytics, rules, models and results together. The very nature of the technology manifests into a deployment model that minimizes human resource hours and maximizes speed to delivery. Combining these intrinsic delivery benefits with a deployment methodology that is as unique as its technology, Pneuron allows clients to implement Distributed Analytics solutions at a fraction of the traditional costs of most enterprise deployments.

For more information on the Pneuron Solution and the benefits it can bring to your organization, please feel free to connect with us:

- info.pneuron.com
- youtube.com/PneuronCorp
- plus.google.com/+Pneuron
- linkedin.com/company/pneuron-corporation
- twitter.com/Pneuron_Corp

You can also visit our website at www.pneuron.com, follow our blog, email us at info@pneuron.com or call us at 1.877.55RAPID (1.877.557.2743).

“Pneuron is truly a game changing capability.”
- Robin Bloor, CEO, Bloor Group