CAS: Adapting Event Processing to Business Intelligence

Company Profile: Celequest

Corporate Snapshot

- Founded by Diaz Nesamoney - former Informatica co-founder & COO; a $200M+ public company
- Leading provider of Operational Performance Management solutions
- Powered by Business Activity Monitoring (BAM) technologies

Awards

Application Areas

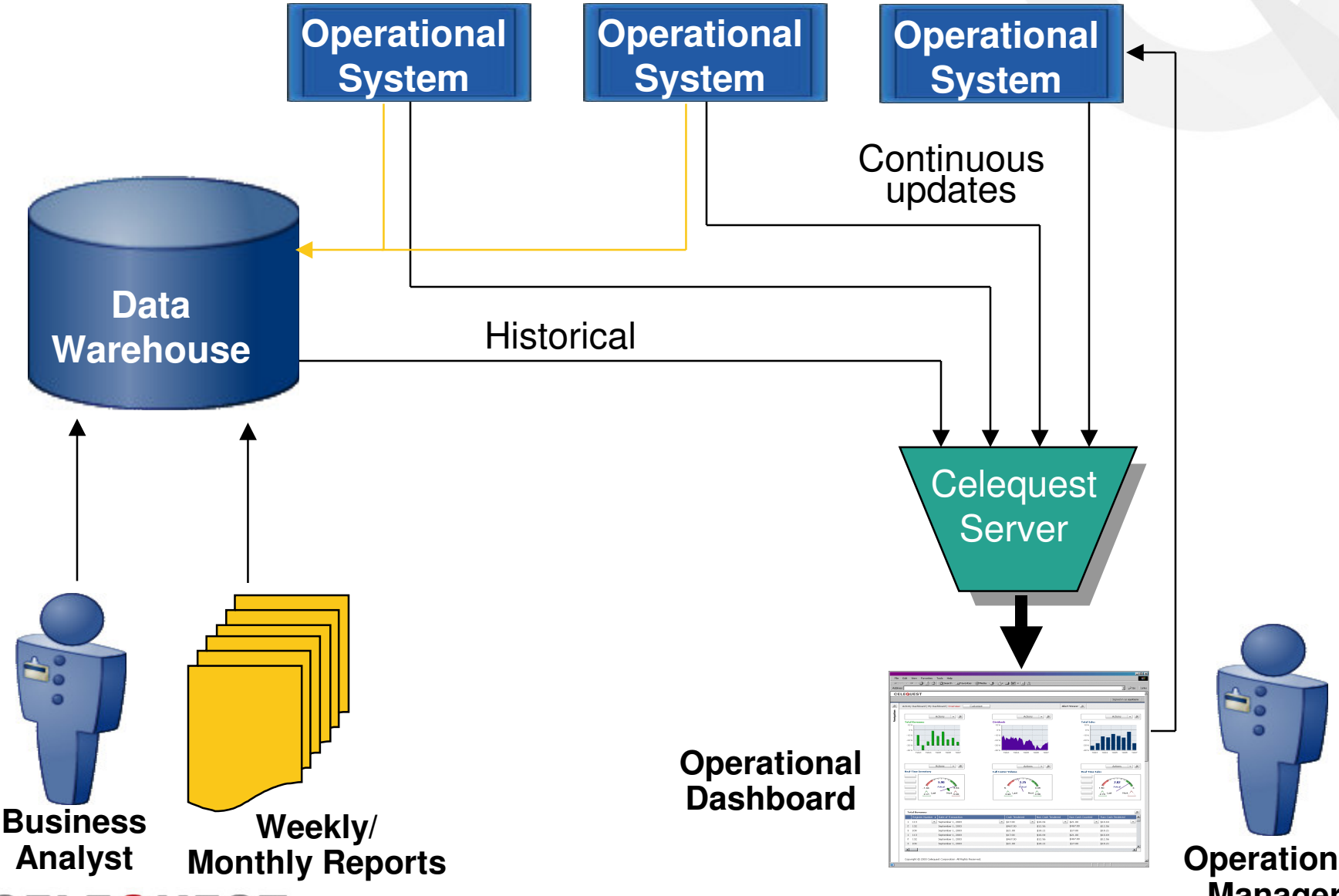
Financial Services | Manufacturing | Retail

Operational Visibility

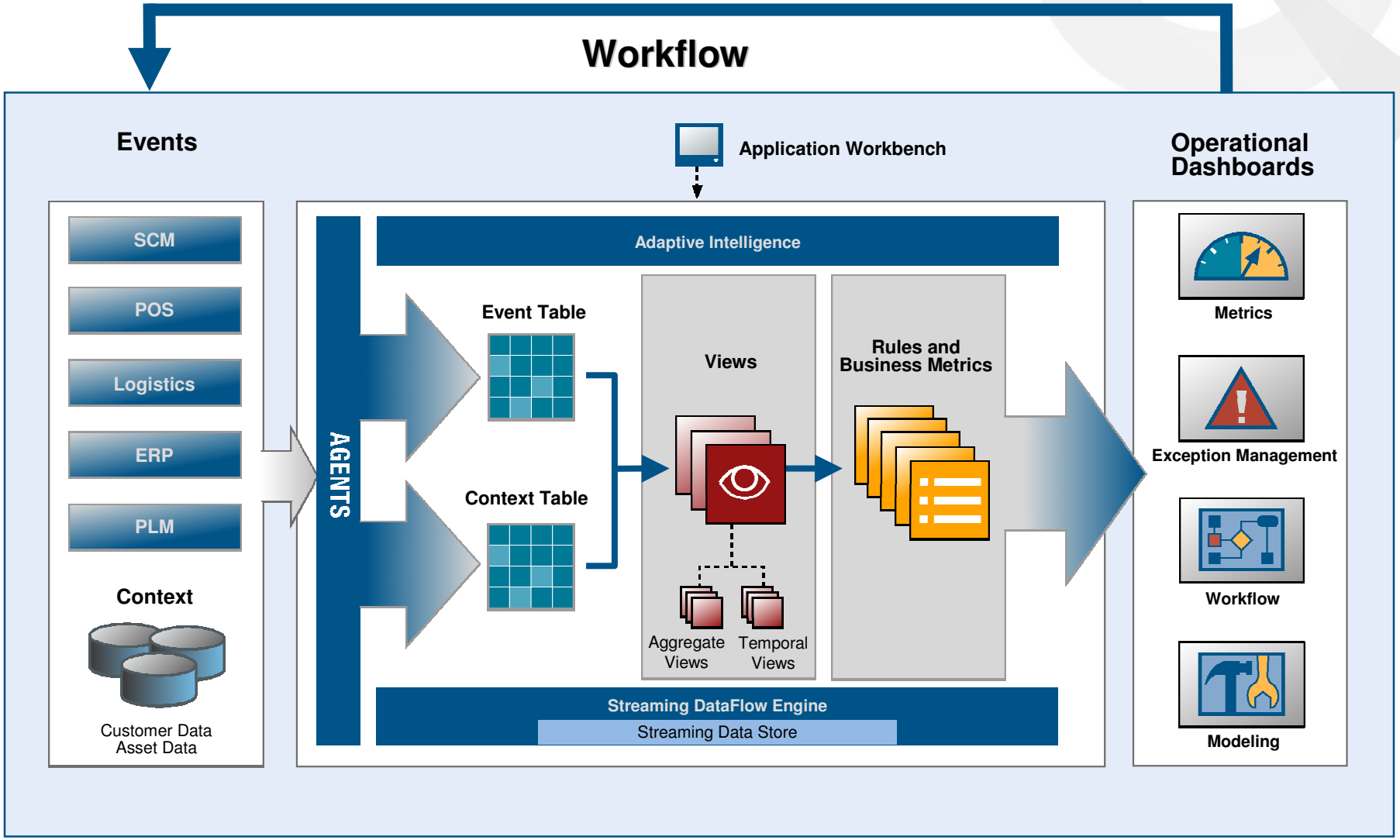
Key Partners

SAP, Ascential Software, Sun microsystems, ORACLE, Satyam, IBM, SYBASE, bea, Providus, hp invent, WIPRO Applying Thought

Operational Business Intelligence



Celequest Activity Suite Architecture



Core Technology

- Celequest technology is comprised of the following six key components:
  - Event and Context Engine
  - Stream Database
  - Rules Engine
  - Alert Engine
  - Metadata Server
  - Security Manager
  - Visualization Engine

Event & Context Engine

- Event Capture
  - Support for Asynchronous event processing (Pub/Sub Model)
  - Support for Synchronous event processing (Polling)
    - Polling is based on a scheduled time
- Event Consolidation
  - Support for aggregating multiple event streams into a single event stream
- Capability to process high volumes of data with variable data arrival rate
  - Event Throttling
  - Load Shedding
  - Support for processing events in the order of arrival

Event & Context Engine

- Data Correlation (aggregation) across heterogeneous information stores
  - Joining the events to one or more Context to provide a rich set of information to build Business Rules, Context Sensitive Alerts and Key Performance Indicators
- Context Query Result Cache
  - Support for cache invalidation schedule.
- JDBC specific Context Query Optimizations
  - Connection Pooling
  - Prepared Statements
- Schema transformation
- Data Type Casting and data transformation
- Query Rewrite
  - Predicate Push-down

Adapters

- Messaging
  - Tibco
  - IBM MQ Series
  - JMS
- JDBC
- Web Services
  - Salesforce, BAAN
- Flat Files: CSV, Fixed Width, XML
- HTML Post/XML
- Enterprise Adapters: SAP, Siebel, PeopleSoft, Oracle, JD Edwards
- SDK for additional external adapters

Stream Database

- Memory based Database
- Celequest Query Language (CQL)
  - Syntax is based on SQL 92 and supports SQL 99 OLAP extensions
  - Additional constructs for sliding windows
    - Support for Event and Time based window frames
    - Support for Internal and External timestamps
  - Includes syntactic shortcuts, and defaults
  - Support for UDFs
- Support for Cubes and Dimensional modeling
  - Support for PLANS at specific dimensional hierarchies
- Time-series support - ability to track spikes and trends
- Views are materialized and incrementally maintained
  - Patent pending incremental view materialization algorithms
  - Unlike conventional RDBMs where queries are executed over entire dataset time after time, in our model queries are *continuously* executed over data streams, and hence query results are incrementally maintained. This model allows us to efficiently process vast number of queries and rules against large volumes of data.

Stream Database

- Views are compiled and executed based on the Volcano Operator model
- Query Plans composed of three main components
  - Operators
  - Inter-operator Queues
  - State (synopses)
    - Summarize tuples seen so far for operators requiring history
    - To implement windows
- General Query Optimizations
  - Cost base optimization algorithm
  - Join order optimization: selecting the optimal join order based on dynamic programming algorithm
  - Hashed-based Group By
  - Constant folding

Rule Engine

- Rule Management
  - Rule Categorization
- Rule evaluation
  - Supports complex expressions
  - Alert Escalation (Rule chaining)
  - Alert Acknowledgement (Rule chaining)
- Temporal Processing
  - Holds for
- Rule Serialization (Raise, Lower)
- “For Specific” construct
- Rule Templates

Alert Engine

- Alert State Management
  - Raised (“for specific”)
  - Lowered
  - Acknowledged
- Ability to include reportlets
- Alert Acknowledgement
- Alert Content Formatting
- Alert Dispatch
  - Alert Consolidation
  - Support for Text, HTML and Excel attached alerts
  - Excel RTD
  - Email, Fax, Web Services
- Alert Persistence
- Ability to assign Mandatory / Optional subscriber lists

Metadata Server

- Transactional support for Metadata updates.
- Stored in standard SQL database
  - SQL Server
  - Oracle
  - DB2
  - Sybase

Server Connectivity

- Third party applications can access/query Celequest's real-time views via
  - Our JDBC Client
  - HTTP Post / XML

Security Manager

- Role & User Based Security
- Support for LDAP user authentication
- Support for Single Sign On
  - Netegrity
- Object Level Security with following permissions:
  - Create
  - Read
  - Read / Write
  - Grant
- Data Level Security
  - Support for security filters at dimensional levels

User Interface

- Self Service UI
  - User Defined Rules and Alerts on data streams
  - User Defined Dashboards and Portlets
- Support for Rule Templates
- Dynamic Data Modeling
- Interactive Configurable Environment that allows you to build highly personalized Dashboards to monitor your key indicators and be alerted of operational events based on your role.
- DHTML / Flash

Performance/Scalability/Reliability

- Highly parallel processing
  - Thread pools
  - Pipelining
  - Partitioning
- Full transaction recovery if system goes down
- Support for large TPS
- Supports large numbers of end users

Use Case 1

- Event data
  - Web reservation requests from more than one site
  - Coming through the Tibco bus
  - Context stored in Oracle RAC
  - 3 channels and 15 messages
  - 15 event streams
- Analytics
  - Aggregate data based on brand and time
    - Hotel/Rate/Area Availability.
    - Denials.
  - Monitors SLA. Requires 7 –8 seconds response time for partners.
  - Aberrations in service (peaks/valleys in demand)
  - Transaction processed/sec
  - Aggregation of requests per channel

Use Case 2

- Leading Parts supplier
- Monitor their workflow.
- BAAN data exposed as Web services.
- Analytics
  - Inventory
  - Moving goods
  - Shipped goods

Use Case 3

- Non profit Organization wanted to monitor its charity work.
- Events and Context stored in JDBC.
- To monitor exceptions and their workflow management tool.
- Analytics
  - Average SLA
  - Modified Life Path.
  - Happy Life Path.
    - How many of the requests have been satisfied.