Service Oriented Architecture and the DBA

Kathy Komer    Aetna Inc.
New England DB2 Users Group
Tuesday June 12   1:00 - 2:15
Service Oriented Architecture and the DBA

- What is Service Oriented Architecture (SOA)
  - Information on Demand
  - Master Data
- The challenges and opportunities for DBAs
- Database Architecture and Design for SOA
- Systems and Infrastructure Impacts for SOA
- Best Practices and Lessons Learned
Aetna Inc.

Aetna is one of the nation’s leading diversified health care benefits companies, serving approximately 29.9 million unique members with information and resources to help them make better informed decisions about their health care. Aetna offers a broad range of traditional and consumer-directed health insurance products and related services, including medical, pharmacy, dental, behavioral health, group life, long-term care and disability plans, and medical management capabilities. Our customers include employer groups, individuals, college students, part-time and hourly workers, health plans and government-sponsored plans. www.aetna.com
SOA - How did we get here?

- Increased Management Interest/Understanding of SOA
  - Bottom line value for companies
- SOA is about the business and IT
  - SOA is a journey – a multi-step process
  - Growing acceptance of SOA as an approach to integrate and to structure collections of interacting applications/services
- Many approaches – different results
  - Same as current development methodology
  - Start with a clean slate or incorporate legacy
  - Vendor Product driven or Business driven
- Information and Database Role
  - Analysis and design
  - Resource optimization
  - Problem resolution
- Provide SOA foundation, experiences and areas for further investigation
What is Service Oriented Architecture

- An approach that enables business processes to be assembled from reusable components or services that are independent of applications and the computing platforms on which they run
  - The business design describes how the business works and is thought of as a compilation of services.
  - Business processes are defined as services.
  - The information system design is driven from the business design.
  - Enables flexible connectivity of applications and resources
  - Enables flexibility in an technology agnostic manner
  - Uses interface-based service descriptions
  - Architectural style that exploits specific principles and characteristics
Principles & Characteristics

- **Componentized**
  - Standardized services interfaces

- **Interoperable**
  - Easy information exchange

- **Modular**
  - Mix and match, add and remove for business processes, information services and infrastructure

- **Scalable**
  - Adding additional resources as needed

- **Loosely Coupled**
  - No dependency on another service implementation
  - No impact to the service from changes to the implementation
Wide Range of SOA Views

- **Business**
  - A set of services a business wants to expose
  - Customers or partners or other parts of the organization

- **Architecture**
  - An architectural style
  - Requires a service provider, requestor and service description
  - A set of architectural principles, patterns and criteria which address modularity, encapsulation, loose coupling, separation of concerns, abstraction, reuse, composability and single implementation

- **Implementation**
  - A programming model
  - Standards, tools and technologies such as Web Services
Value and Benefits

- **Business challenges**
  - Risk, revenue, cost, integration, delivery and innovation

- **CEO**
  - Provide business flexibility and enable growth
  - Provide for Business innovation

- **Line Of Business**
  - Enable rapid change to be competitive
  - Improve business processes

- **CIO**
  - Align IT priorities with business goals
  - Protect investments
  - Simplify IT Infrastructure

- **IT Management**
  - Lowering total cost and simplify integration
  - Rapid implementation of change
Moving toward SOA

- **Driving Forces**
  - Emerging industry standards
  - Access to enterprise data
  - Easier exchange of data
  - Consistent enterprise data
  - Reduced development time
  - Reduced costs
  - Availability of external services
  - Better integration – internal and external (business partners)

- **Restraining Forces**
  - Costs
  - Service scope
  - “Bleeding edge” technology
  - Data Redundancy
  - Performance Requirements
  - Not invented here
  - Lack of training/understanding
  - Inertia – why change
Recognizing a service?

- Service is a repeatable task within a business process.
- Varied interpretations of this
  - Function within application?
  - Include system services?
  - Are all applications services?
  - Do components make up services?
  - Can information be a service?
  - Are resources services?
- Enterprise services
  - Functional services
  - Business services
Is Everything a Service

- Business Logic - Applications
- Common Services
  - Enterprise Services – Common Access
  - Multiple Broker Transports Work Together
- Information Services - Data
Integrated Business View

Business Systems
- System 1
- Web
- Legacy
- Other

Member
- Services
- Databases

Provider
- Services
- Databases

Claim
- Services
- Databases

Application Integration
- Transport
- Transformation
- Validation
- Routing
- Adapters

Enterprise Service Bus

Data Integration
- Receipt
- Transform
- Delivery
- Extract
- Load

Plan Sponsor
- Services
- Databases

Other
- Services
- Databases
Enterprise Service Bus

Composite Service

Dynamic Routing
Mediation

Security
Audit/Event Notification

Message Augmentation
Protocol Transformation

Enterprise Service Bus

Enterprise Business Services

Enterprise Services
Impact of Standards

- For Web Services
  - XML
  - WSDL
  - JMS

- For Information
  - XQuery
  - XPath
  - JSR170
  - JDBC
  - SQL
  - BPEL

- Service Data Objects (SDO)
  - Abstraction/Realization for ‘sources of data’
  - JDBC/SQLJ
  - XML
  - ESB Messages
Best Practices SOA & Web Services

- Loose coupling and flexibility must be designed and built in
- Services designed to reduce change for future business requirements
- Design services to provide for re-composition or dynamic reconfiguration
- Avoid business logic in the Enterprise Service Bus
- Certification of web services based on defined characteristics provides for effective usage
SOA Evolution and Maturity

- Business View - Function Oriented to Service Oriented
- Systems – Silo to Integrated to Components to Services
- Methodology - Structured Methods to Component Based Development to Service Modeling
- Applications – Modules to Components to Services
- Architecture – Monolithic to Layered to Component to Services Oriented
- Infrastructure – Platform Specific to Platform Neutral to Sense and Respond
Information Management

- **Objectives**
  - Right information, right people, right time
  - Horizontally integrate information
  - Integrate, analyze, and optimize heterogeneous types and sources of business information throughout its lifecycle
  - Use information to manage risk and create new business insight

- **Difficulties**
  - Complex information architecture
  - Each new process builds a connection to information
  - Lack of enterprise cradle-to-grave information lifecycle management
  - Lack of ability to centrally govern information
  - Difficult to change processes as needed
Information on Demand Capabilities

- **Information as a Service**
  - Consistent, managed information available to business processes in a standardized way for reuse

- **Master data – Single view of the truth**
  - Consolidated view of core business entities

- **Metadata Management**

- **Data Quality**
  - Understanding of structures and content – Trusted data

- **Virtualized data**
  - Real time unconstrained access - Location Transparency

- **Optimized Data Movement and Placement**
  - Information Integration

- **Business Intelligence and Analytics**
Master Data

- The facts describing core business entities: customers, products
  - The high value information used by many business processes
  - Used across the enterprise
  - Data is critical (currency, quality) for key business processes
  - Provides the business context for a particular domain
  - Master data does not imply a particular usage pattern and is application independent

- Metadata
  - Definitional Master Data – definition of types of business entities
  - Instance Master Data – Values of the definitional master data for business entities

- Management
  - Decouples master information from individual applications
  - Simplifies ongoing integration and new application development
  - Ensure consistent master information – transactional and analytical
  - Proactively addressed data quality and consistency
Challenges and Opportunities

- Current database portfolio
- Database methodology paradigm shift
- Changing application characteristics
- Pace of technology change
- Evolving DBA responsibilities
- Metrics
Current Database Portfolio

- Characteristics of today’s databases
  - Current databases defined and built without a planned published architecture
  - Information architecture complexity
  - Purchased applications
  - Incorporate legacy
  - Tight coupling of data to process
    - Inconsistency in sources and how data is derived
    - Multiple points of maintenance
    - Inconsistent rules applied to data
    - Inconsistent ‘view’ of the data
Database Methodology Paradigm Shift

- Current Methodology
  - Design, Code and Implement
  - Model, Assemble, Deploy, Manage

- Model Based Development
  - Requirements driven by business view of information
  - Several applications/services accessing one database
  - Physical design complexity
  - Application/Services Delivery Process

- Increased Complexity in several dimensions
  - Database structures
  - Database access by applications and services
  - Performance & Availability
  - Consolidation of data sources - Master data
  - Service Levels
Changing Application Characteristics

- Application staffing models and developer skills
- Increased use of dynamic SQL
- Variations in Application Development Methodology
  - Change Management Discipline
- Incorporation of WebSphere or Messaging
  - Asynchronous characteristics
- Application delivery process
  - Stovepipe applications – one application using one database
  - Several applications using one database
  - One application using several databases
- Capacity Management
  - Resource consumption & Rate of change
Changing Application Characteristics

- Architectural Changes
  - Information Integration
  - Content and other unstructured data
  - Master Data
  - Business Intelligence
  - ETL
  - Cross Functional Applications

- Composite applications
  - Business logic and resources spanning multiple systems
  - Difficult to design, build, test, and manage
  - Usually require high performance and availability
  - Must have a holistic approach to management
  - Composed of services
Pace of Technology Change

- Traditional Focus
  - Database and SQL

- Today and Future
  - Use of XML
  - Structured and Unstructured Data
  - Cross product integration - EII
  - Replication – ETL
  - Enterprise Services
  - Master Data
  - Standards and Open source impacts
Evolving DBA Responsibilities

- Traditional DBA Responsibilities
  - Logical and Physical Database design
  - Performance - CPU, disk, memory tradeoffs
  - Availability - Backup and recovery

- Additional Responsibilities
  - Technical Architecture
    - Platform and product selection, recommendation and use
    - Services Architecture – Information Services
  - Management of increased database, transaction & service volumes
  - Integration/implications of Websphere, MQSeries and CICS.
Changing Metrics

- New Definitions of Success - How is success measured today?
- Measures
  - Identification of characteristics to be measured
- Database and Infrastructure
  - Service Level Agreements
  - Availability
  - Performance
  - Service performance measures
- End to end Measures
  - Databases, Information Services and Infrastructure - part of larger more holistic measurements
- Determine Rewards - salary/bonus
Database Architecture and Design for SOA

- Information Architect and DBA Roles
- Architecture Process
- Design Process and Patterns
- Reuse
- Governance
Information Architect and DBA Roles

- Encompass enterprise and project view
  - Expand current view

- Evolving responsibilities
  - Key partner with business analysts, enterprise and application architects, application development and business analysts
  - Knowledge of internal systems/services and databases for external interface
  - Knowledge of databases, content repositories and metadata
  - Enabler in business intelligence and information integration
  - Multi Lingual - know multiple DBMSs
  - Expanded role - transition to information/enterprise architect
Architecture Process

- Business Process Requirements
  - Information/Logical Model
  - Model Based Process
- Information as a Service
  - Business Rules
- Metadata Management
- Patterns
  - Information Transformation - ETL
  - Information integration
  - Data Replication
  - Availability
    - Infrastructure and Backup/recovery
  - Security
  - Scalability
Design Process and Patterns

- Database development process
  - Business requirements inputs to design
  - Blueprint and pattern inputs to design
- Consistent processes
  - Information Service design
  - Application design
- Data Access requirements
- Planning for capacity growth and volume increases
- Use of standards
- Measures
  - requirements for time, resources, quality and scope
Reuse

- Planning and identification of artifacts for reuse
  - Blueprints and Patterns
  - Models
  - Information structures
  - Database designs
- Data and information reuse
  - Shared databases – data
  - Information services
- Measure the value
  - Degree of reuse
- Repository
  - Models, structures and patterns available
Governance

- Established process for governance
  - What has to be done?
  - How is it done?
  - Who has the authority to do it?
  - How is it measured?

- Ensure architecture and design compliance for alignment to technology architecture and traceability to business requirements

- Use of business and technology blueprints and roadmaps

- Establish process for governance reviews
  - Issues escalation and resolution
Systems and Infrastructure Impacts for SOA

- Platform Selection
- Technology Blueprints
- Environment Growth and Management
  - Configuration Management
  - Multiple environments supporting multiple delivery paths
- Infrastructure
  - Software and Systems Impacts
  - Code Asset Management –
    - Build and Reuse
  - Change Management
  - Problem Resolution
  - Service Level Agreements
Platform Selection

- Architecture and DBA Coordination
  - Analysis and decision roles
- Characteristics
  - Workload
  - Reliability
  - Availability
  - Concurrent users
  - Database sizes
  - Transaction volumes
- Methodology
  - Consistent process
Technology Blueprints

- Linkage to other Enterprise Strategic Plan
  - IT Planning and Initiatives
  - Business, Information, Application Architecture

- Blueprint Value
  - Current and future technical capabilities
  - Prioritize future state capabilities
  - Gap assessment
  - Market scan, product identification
  - Reference architecture and strategic products to address gaps
Environment Growth and Management

- Environment creation, maintenance, problem resolution, obsoletion and removal
  - Configuration Management
  - Growth and scale of environments
  - Duplication of environments

- Patterns
  - Models
  - Design and Deployment
  - Administration and Management

- Application Testing
  - Unit, System, Stress, QA testing
  - Regression and new function
Infrastructure

- DBMS and supporting software
  - New versions and upgrades
  - Fixes
  - Prerequisites and Dependencies
- Introduction of Change
  - Infrastructure Growth
  - Manual vs. Automated
- Application Release management
  - Planning for and management of scope, scheduling, access path selection, reuse and maintenance
- Change Management
  - Protect availability, manage risk, provide audit, reduce failures
Common Pitfalls

- SOA equals Web Services
  - Use existing APIs, little architectural focus
- IT Leading the SOA effort
  - Lack of Business Alignment
- Not much really new
  - Failure to see and incorporate value
  - Oversimplify
- Big Bang
  - Change systems and architecture all at once
Lessons Learned

- SOA requires effort
  - Don’t assume that someone else can and should do the hard work
- Over Communicate
  - New methodology and language involved
- Whatever is delivered won’t be perfect
  - Trying to make it perfect is futile
- Leave it on the shelf
  - White papers don’t equal success
- Implementations involve many versions or releases
  - Services life cycle and maintenance
Lessons Learned

- Successes incorporate technology, products, methodology and organization/culture
- Define and update Information Architect & DBA Role
  - Flexibility is key
- Integration with and understanding of related products is needed (i.e. WebSphere, CICS, MQSeries)
- Prepare for growth and scalability
- SOA is a team sport
Summary

- Roles and Organization
  - Teamwork with Business Analysts, System Architects, Information Architects and DBA
- Technology
  - Leverage existing, prepare to change
- Methodology and Processes
  - Architecture and Design
  - Increased integration and complexity
- Reuse
  - Reusable patterns, designs, structures, databases
- Service Oriented Architecture
  - The question isn’t ‘If’ the question is ‘When’
Resources and References

- Service Oriented Architecture
  http://www.ibm.com/developerworks/webservices/newto/
- Standards and Web Services
- Information on Demand
  http://www.ibm.com/software/data/ondemandbusiness/
- Service Data Objects
- Master Data Management
  http://ibm.ascential.com/solutions/master_data_management.html