What's New for Developers in SQL Server 2008

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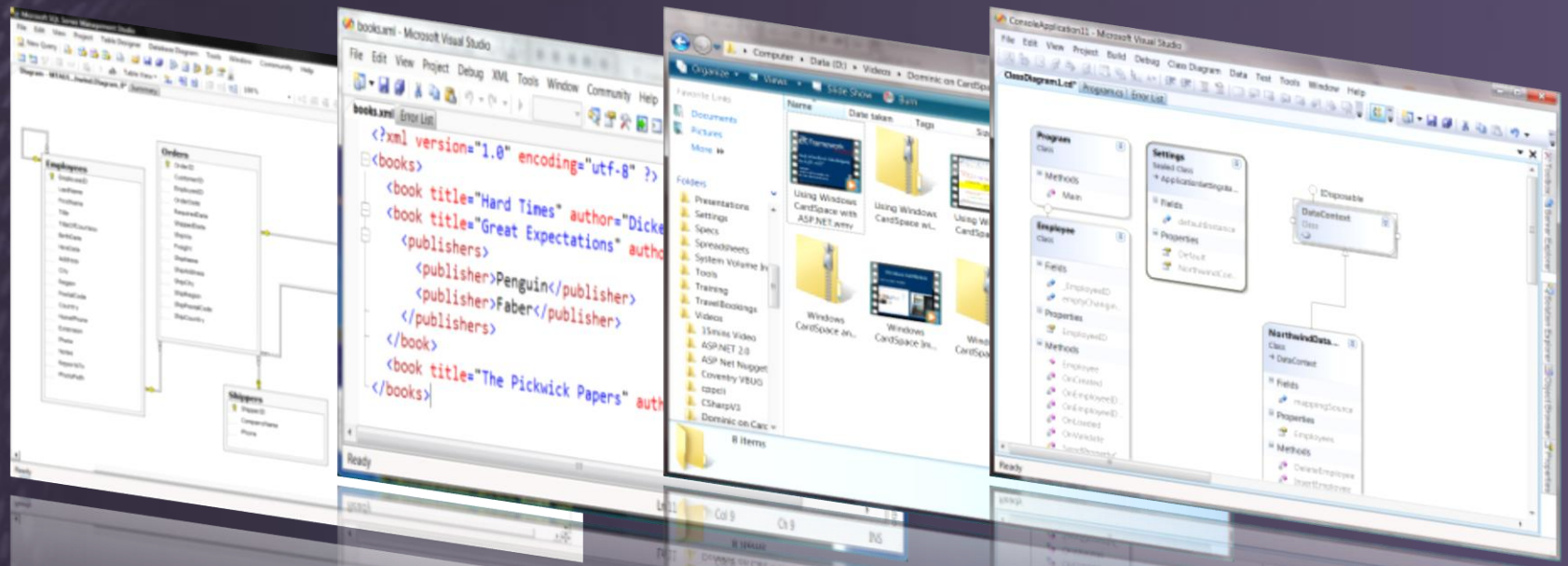
Agenda

- Relational++
  - New data types beyond the traditional RDBMS
- Data In, Data Out
- Information from Data
- Database Applications
- Core Capabilities & Tooling

Relational++



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New Data Types

- FILESTREAM
  - Extension to varbinary(max)
  - Data is stored in the file system
  - Access with file system API's or relational API's
- HIERARCHY ID
  - Model the traditional employee/manager relationship
- New Date & Time data types
  - DATE, TIME, DATETIMEOFFSET, DATETIME2 & functions to deal with them

XML Data Type Enhancements

- Improved schema validation support
  - Supports validation of Office 12 documents
  - Allows for lax content
  - Unions of lists
  - Lists of unions
- XQuery support
  - FWOR finally becomes FLWOR (the **let** clause)
- Use of variables in **.modify()** operations

CLR Data Type Enhancements

- UDTs > 8K possible for CLR implementations
- Aggregates
  - Multi-input aggregates now possible in CLR implementations
  - Aggregates > 8K now possible in CLR implementations
- Sort order on CLR Table Valued Functions
  - Today, SQL spools output from CLR TVF's and ***then*** sorts them – often this is redundant

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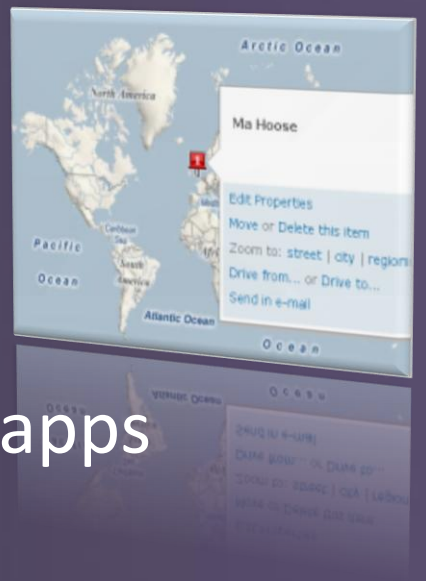
Data Types, XML, CLR

Spatial Data



- Proliferation of geographical data
  - GPS Systems
  - Virtual Earth, Live Search Maps etc
- New opportunities for spatially aware apps
  - Route planning
  - Land assessment
  - Territory analysis
- SQL Server 2008
  - Storage and retrieval of spatial data using standard SQL syntax

Spatial Data Types

- Comprehensive Support
  - Flat Earth (Planar) - geometry
  - Round Earth (Geodetic) – geography
- CLR System Types
  - `Microsoft.SqlServer.Types.Geo[metry | graphy]`
  - Host of useful spatial methods / properties (OGC)
  - Importing of WKT / WKB (OGC) and GML data
- High Performance
  - Integrated into SQL 2008
  - Spatial Index support

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Spatial Data in SQL 2008

Semi-Structured Additions

- Sparse columns
  - Optimised storage for sparsely populated columns
- Wide Tables
  - Support for hundreds of thousands of sparse columns
- Filtered Indexes
  - Define indices over subsets of data in tables

Semi-Structured Additions

'Fixed' Columns | **Sparse Columns**

ProducID	Description	Category	Price	Current	Colour	Size	Volume	Fabric	Fitment	COSHH
1	Dulux Emulsion	Paint	22.95	False	Blue	-	1.5	-	-	8729
2	Roller	Tools	3.95	False	-	L	-	-	-	-
3	Rug	Home	79.50	False	Brown	-	-	Wool	-	-
4	Bulb	Electrical	1.25	True	Pearl	-	-	-	Screw	-
5	Weedkiller	Garden	7.99	True	-	-	1.0	-	-	2776
6	Bamboo	Garden	35.00	True	Yellow	-	-	-	-	-
7	2x4	Wood	2.95	True	-	-	-	-	-	-
8	…	…	…	…	…	…	…	…	…	…

Filtered Index

Data In, Data Out

SQL Server Integration Services

- New Script Environment for Script Tasks & Components
  - VSTA replaces VSA (deprecated)
    - C# language programmability
    - More of the familiar VS environment
- ADO.NET Source and Destination
  - OLEDB source/destinations still there ☺
- Data Profiling Task & Viewer

SQL Server Integration Services

- Data Flow performance
  - In 2005, an execution tree (even with branches) is executed on a single thread
  - In 2008, this is handled differently (i.e. **better**)
- Lookup Transformation
  - Share cached lookup across packages
  - More granular control over cache use for matched/non-matched data
- Additional changes elsewhere
  - MERGE, Change Data Capture, Data Types, etc.

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Integration Services

Tracking Changes

- Change Tracking
  - Synchronous - when the DML is committed
  - Detect **net** changes to data
  - Tables/Rows effectively have a version #
  - Good for building one- and two- way sync solutions
- Change Data Capture
  - Asynchronous - reads transaction log
  - Detect **net** and **incremental** changes to data
  - Good for building one- way sync solutions

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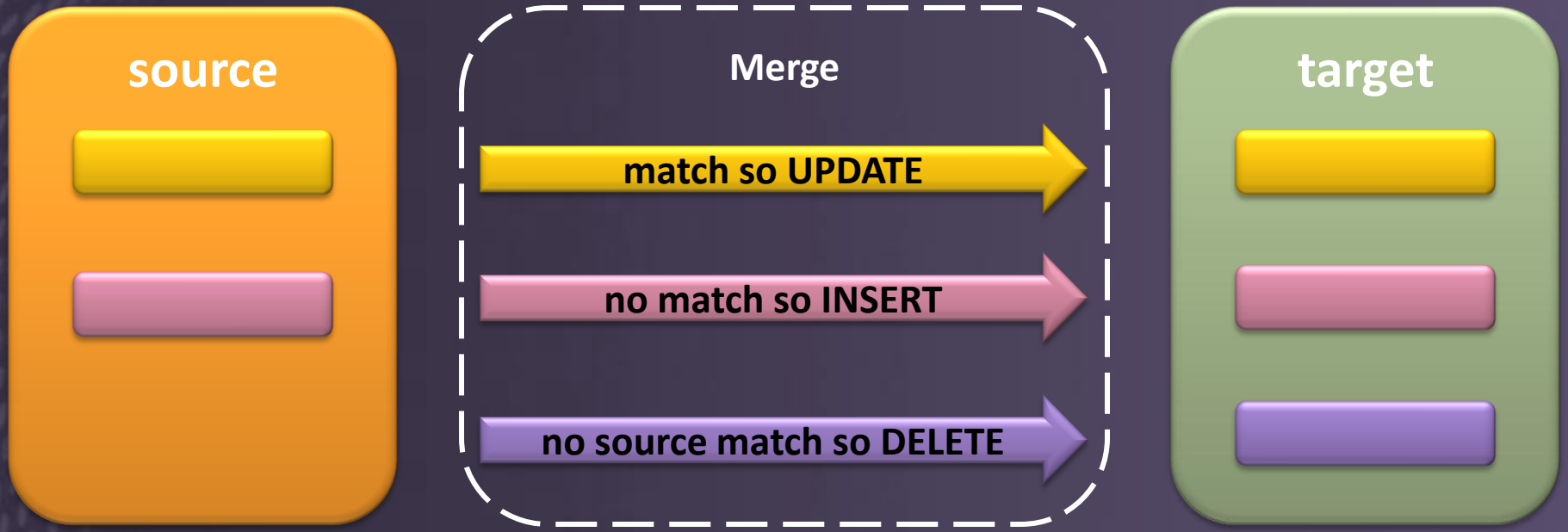
Change Tracking & Data Capture

MERGE

- DML statement combining multiple operations into one



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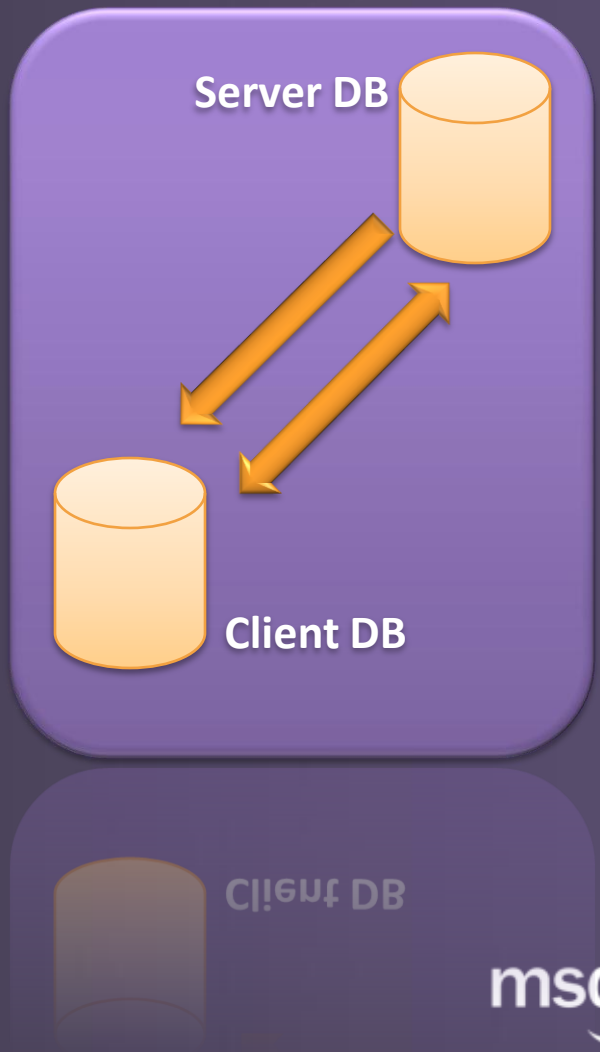
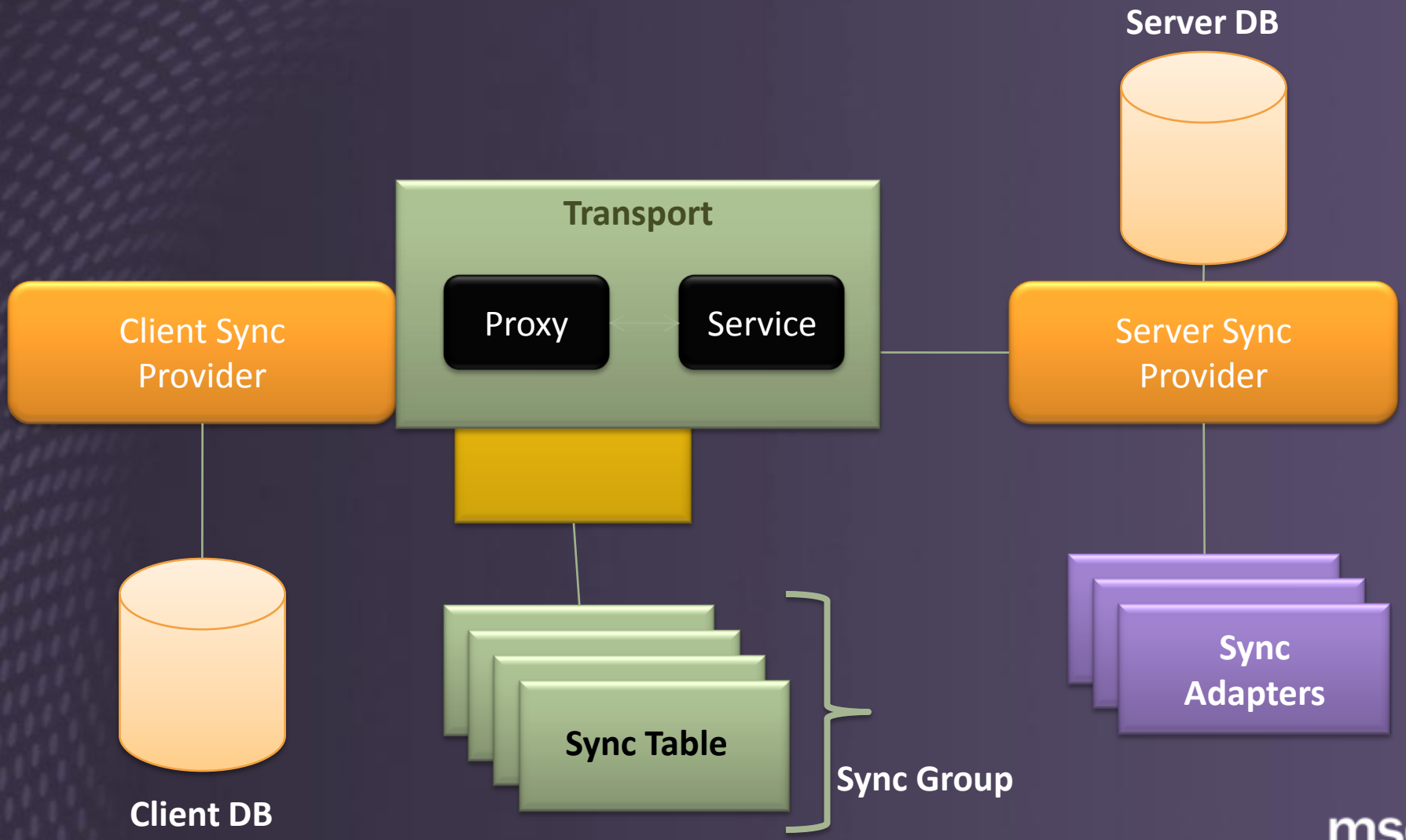
MERGE statement

ADO.NET Synchronisation Services

- Synchronisation ***Framework***
  - Online/Offline Applications
  - 2-tier, N-tier architectures
- Set of components
  - Sync Classes
  - Client Database
    - SQL Server Compact Edition
  - Server Database
    - Any ADO.NET store
- "Service" Based Approach



ADO.NET Synchronisation Services



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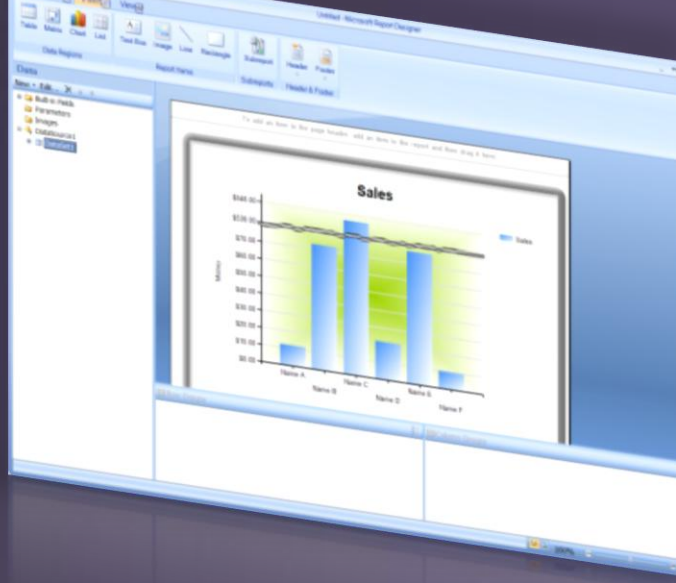
Microsoft Synchronisation Services

Information from Data

Reporting Services

- Dependency on IIS has gone
- New Design Surface
- New Visualisations
- Table + Matrix = Tablix
- Delivery via Microsoft Office



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Reporting Services

Reach All your Users with Scalable BI platform

- Scalable Report Engine
- Scale out Analysis
- Subspace Computations
- New Cube Design Tools
- Best Practice Design Alerts
- Scalable Backup Tools

- Deliver insights throughout your organization
  - Deliver reports of any size at enterprise scale
  - Scale out through read-only Analysis Services storage
  - Enhance analytical capabilities with more complex computations and aggregations
- Deploy and manage your BI infrastructure
  - Streamline development of the analysis infrastructure with new cube design tools
  - Optimize cube design with real time best practice alerts
  - Backup cubes with enhanced scalability

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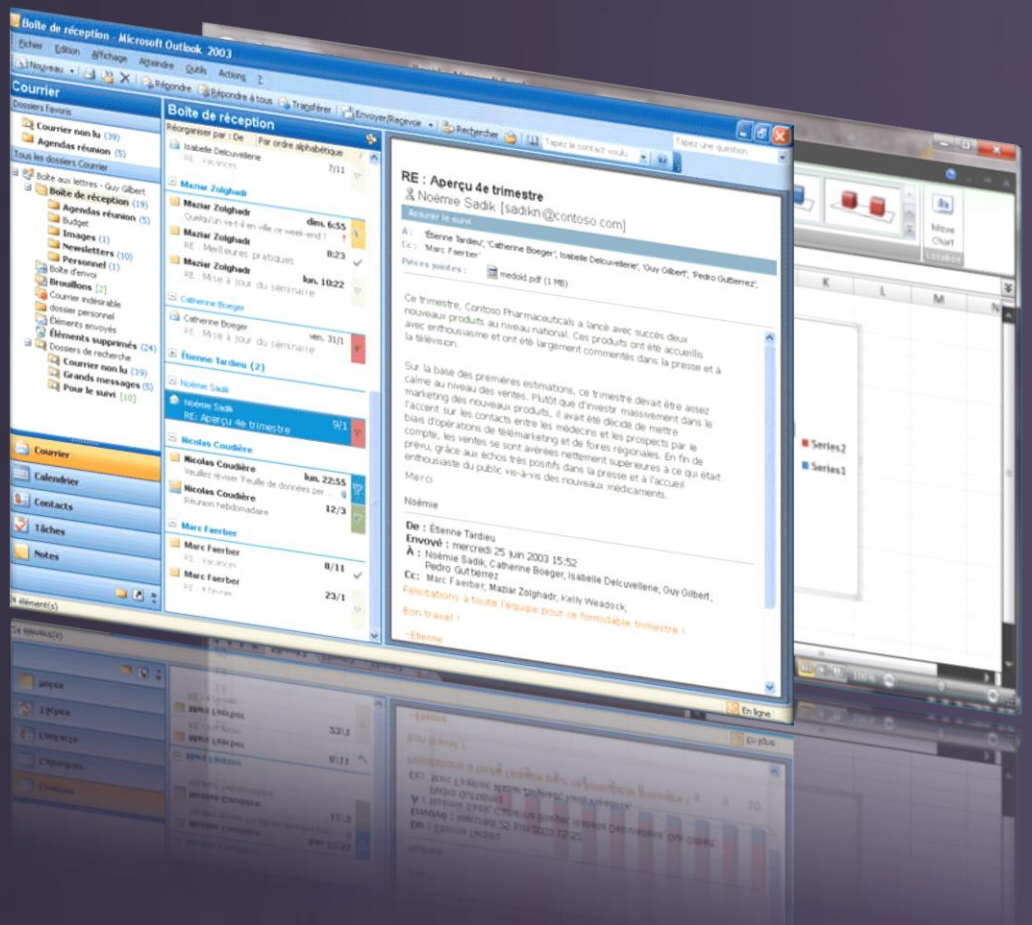
Database Applications



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Client Library Support for Features

- Visual Studio 2008 ships with;
  - .NET Framework V3.5
    - Support for most new SQL 2008 data types
    - Support for table valued parameters
  - Microsoft Synchronization Services
- SQL Server 2008 ships with;
  - Client library support for some new data types;
    - Microsoft.SqlServer.Types.dll (SqlGeometry, SqlHierarchyId)
- ADO.NET V3.0 Entity Framework, Data Services ship separately

Table Valued Parameters

- Stored procedures and functions can now take a table as a parameter
  - Passing “arrays” of data to the server in one go
  - Often done in the past with XML, strings
- Mechanism
  - Declare table type server side
  - Define parameter to be of table type
  - New ADO.NET parameter type **SqlDbType.Structured**
    - Pass **DataTable, IEnumerable<SqlDataRecord>, DbDataReader** into ADO.NET client side

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Table Valued Parameters

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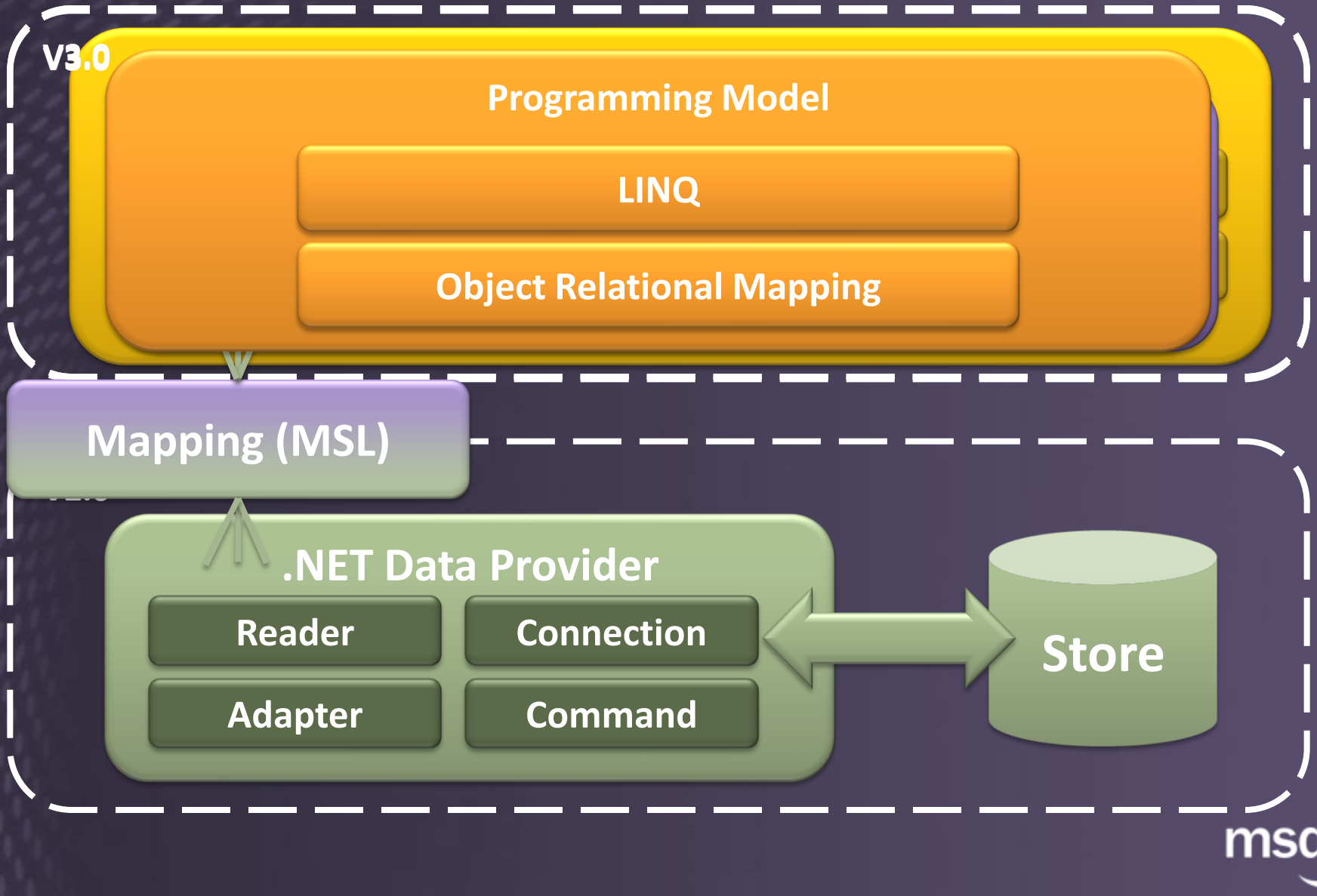
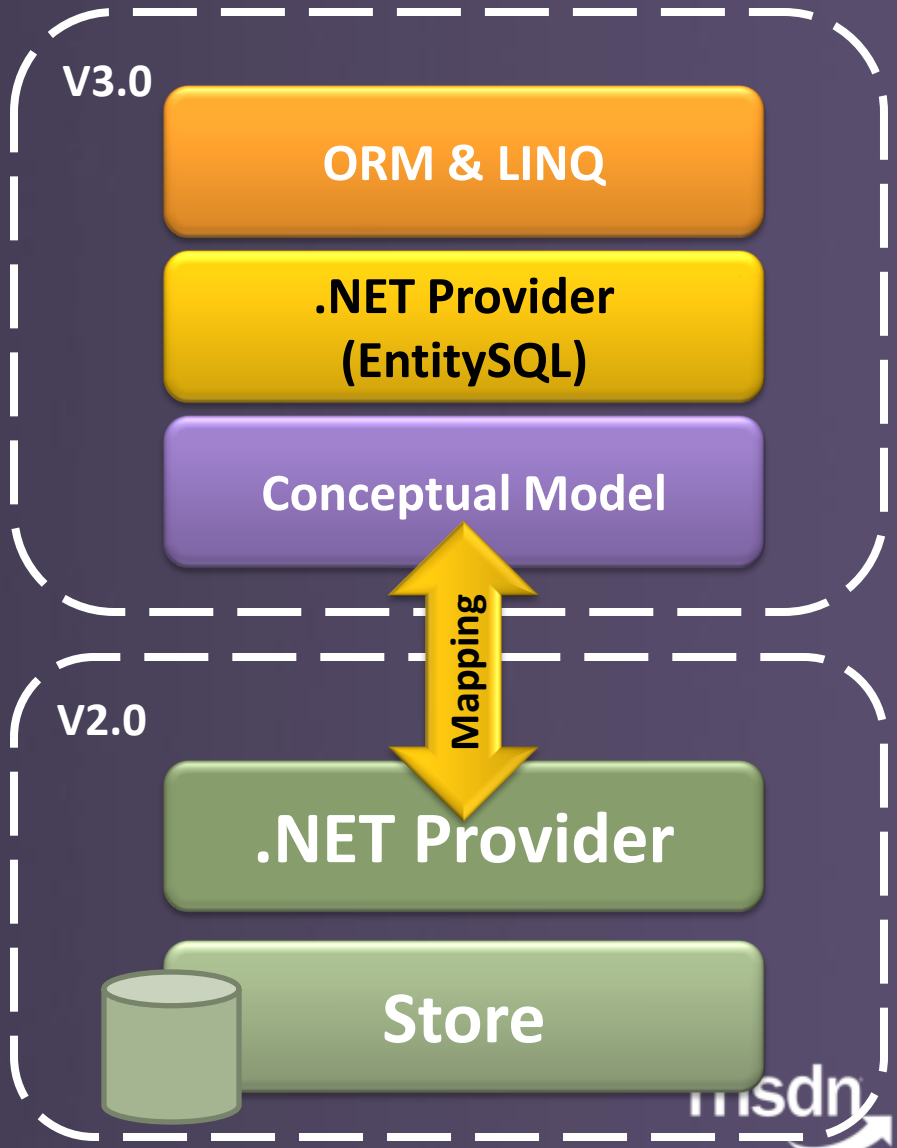
ADO.NET Entity Framework



ADO.NET Entity Framework

- Schema independence
- Store independence
- Higher level constructs
  - Relationships
  - Inheritance
- Status
  - At Beta 2 Today
  - Tooling at CTP 1



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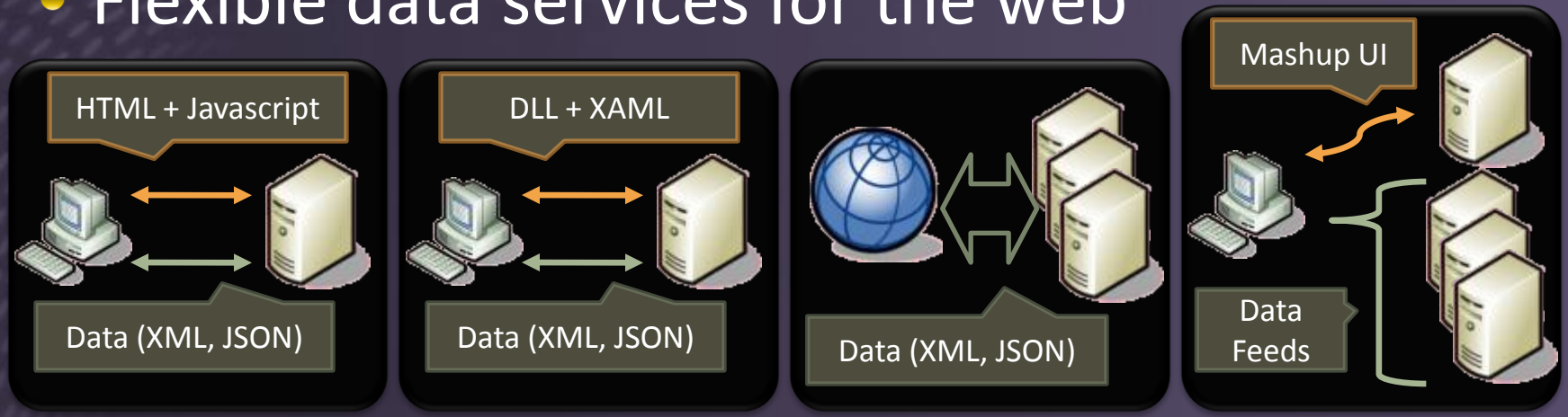
ADO.NET Entity Framework

ADO.NET Data Services ("Astoria")

- Flexible data services for the web



- URI addressable resources (RESTful)
- Simple data formats (XML / JSON)
- Modelling of data with EDM
- CRUD operations support

Astoria URI Format

```
http://localhost/service.svc/Customers[ALFKI]/Orders?$orderby=City
```

- Data Service URL (special WCF service)
- Entity Set Name (eg Customers)
  - Optional Predicate
- Navigation Property (eg Orders)
  - Optional Predicate
- Querystring Options (eg orderby)

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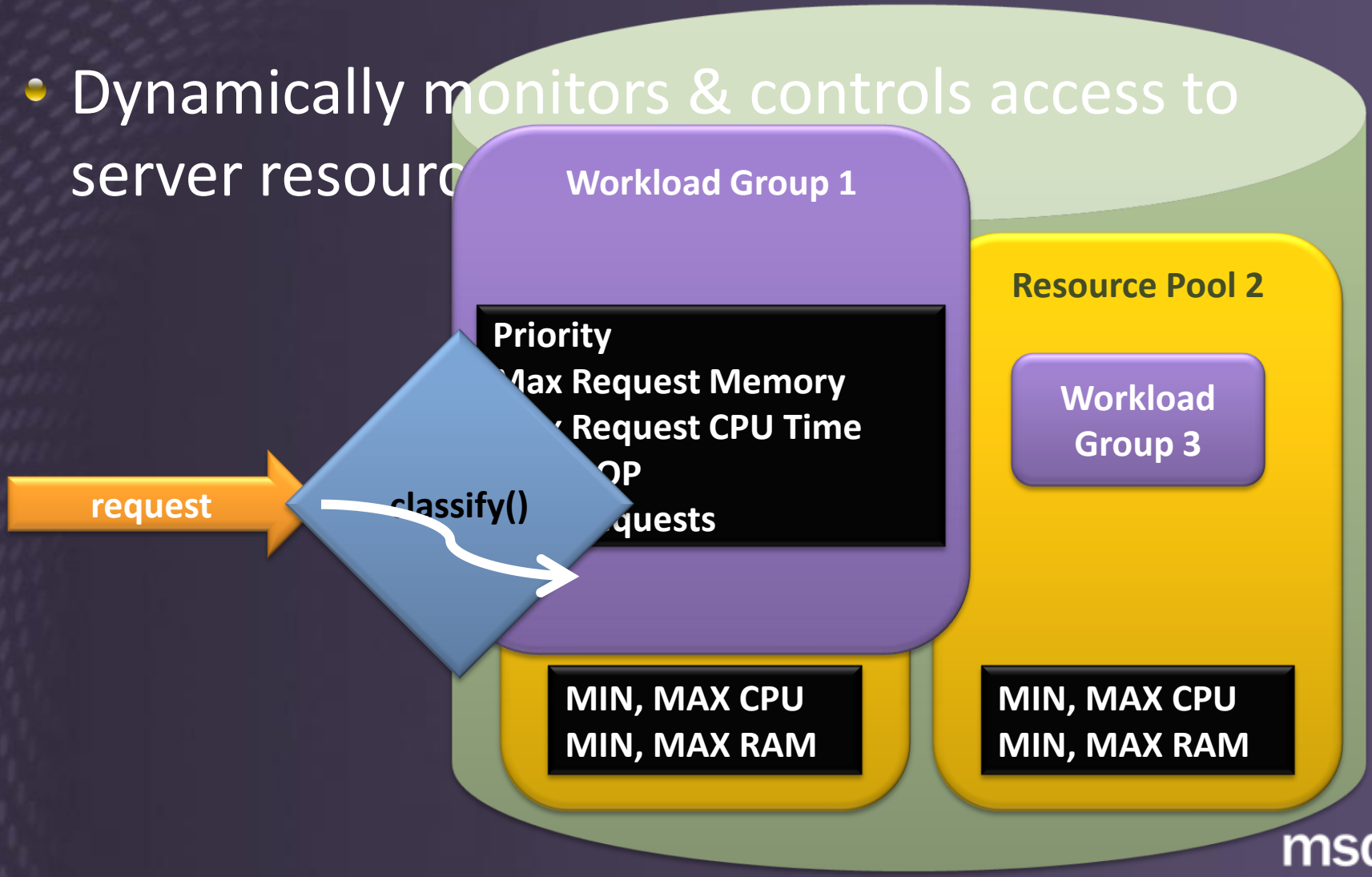
ADO.NET Data Services

Core Capabilities

Resource Governor

- Dynamically monitors & controls access to server resourc



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Resource Governor

Guiding Procedure Execution

- More control & visibility of stored procedure execution to aid predictable execution
  - **sp_create_plan_guide** accepts XML Showplan output
  - **sp_create_plan_guide_from_cache**
  - **sys.fn_validate_plan_guide**
  - Plan guides visibile in Management Studio
- Monitoring
  - Events – **Plan Guide (Un)Successful**
  - Counters – **(Mis)Guided Plan Executions/Sec**
    - on SQL Statistics object

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Guiding Procedure Execution

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Performance Studio

- Unified framework for capturing “metrics” from SQL Server
- Interfaces
  - Mgmt Studio
  - S’procs
  - API
  - Dashboard UI post SQL 2008

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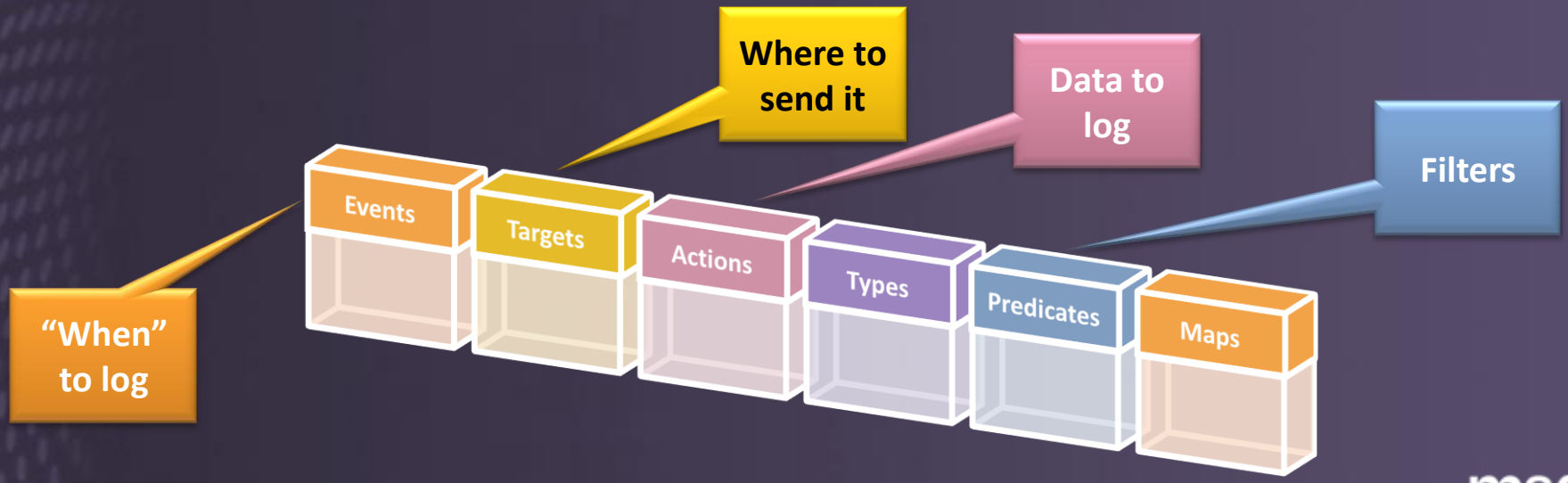
Data Collector

Extended Events (XEvent)

- High performance eventing system for SQL
  - Integrates with Event Tracing for Windows (ETW)
  - Possibility of end-to-end tracing
- DDL for managing event sessions on a server



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Extended Events

Auditing (not in current CTP)

- Written to files or event logs
  - Server level auditing
    - Login, Logoff, Create DB, etc. (many)
  - Database level auditing
    - Changes to Users, Roles, Schema, etc. (many)
  - Granular level auditing
    - CRUD + EXECUTE on tables, views, procedures, etc.

AUDIT UPDATE ON Employee [BY User1]

Platform Enhancements

- Transparent Data Encryption (TDE)
  - Encrypt my data on disk transparent to applications
- Database Compression (not in CTP5)
  - ROW / PAGE Compression
- Integrated Full Text Search (not in CTP5)
  - Easier to deploy / manage and better performance
- Declarative Management Framework
  - Establish policies for monitoring or compliance

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Platform Enhancements

MSDN in the UK

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