



Using LEI 6 to Integrate Domino and DB2 UDB for iSeries

ITSO iSeries Technical Forum
DP13

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- **President of Kim Greene Consulting**
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 - ▶ ***System and application tuning***
 - ▶ ***Enterprise integration***
 - ▶ ***Domino development***
 - ▶ ***Customized education and training***
 - ▶ ***Technical writing***
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- **Domino enterprise integration in R5**
 - ▶ ***DECS***
 - ▶ ***LEI 3.x***
- **Domino enterprise integration in Domino 6**
 - ▶ ***Domino Connection Resources (DCRs)***
 - ▶ ***LEI 6***
 - ▶ ***Integrated credentials***
- **Future plans**

Domino Enterprise Integration in R5

- **R5 offered two different graphical tools for integrating Domino data with external data sources**
 - ▶ ***Domino Enterprise Connection Services (DECS)***
 - Shipped with Domino server starting in 4.6.3
 - ▶ ***Lotus Enterprise Integrator (LEI)***
 - Separate product
 - Required a Domino server to run

- **DECS R5 offered real-time integration with backend systems**
 - ▶ *Data stayed in back-end system*
 - ▶ *Key field(s) in Domino linked the back-end data to individual Notes document*
 - ▶ *Many problems with keeping keys in sync when external applications made changes to back-end data storage system*

- **LEI 3.x provided much more functionality over DECS**
 - ▶ ***Synchronize Domino and external data sources***
 - Maintain two copies of the data, one in Domino and one in original data source
 - ▶ ***Transfer data from one data source to another***
 - Direct transfer activity
 - ▶ ***Many other functions and features***

Enter Domino 6

- **DECS in Domino 6**

- ▶ ***What remains the same?***

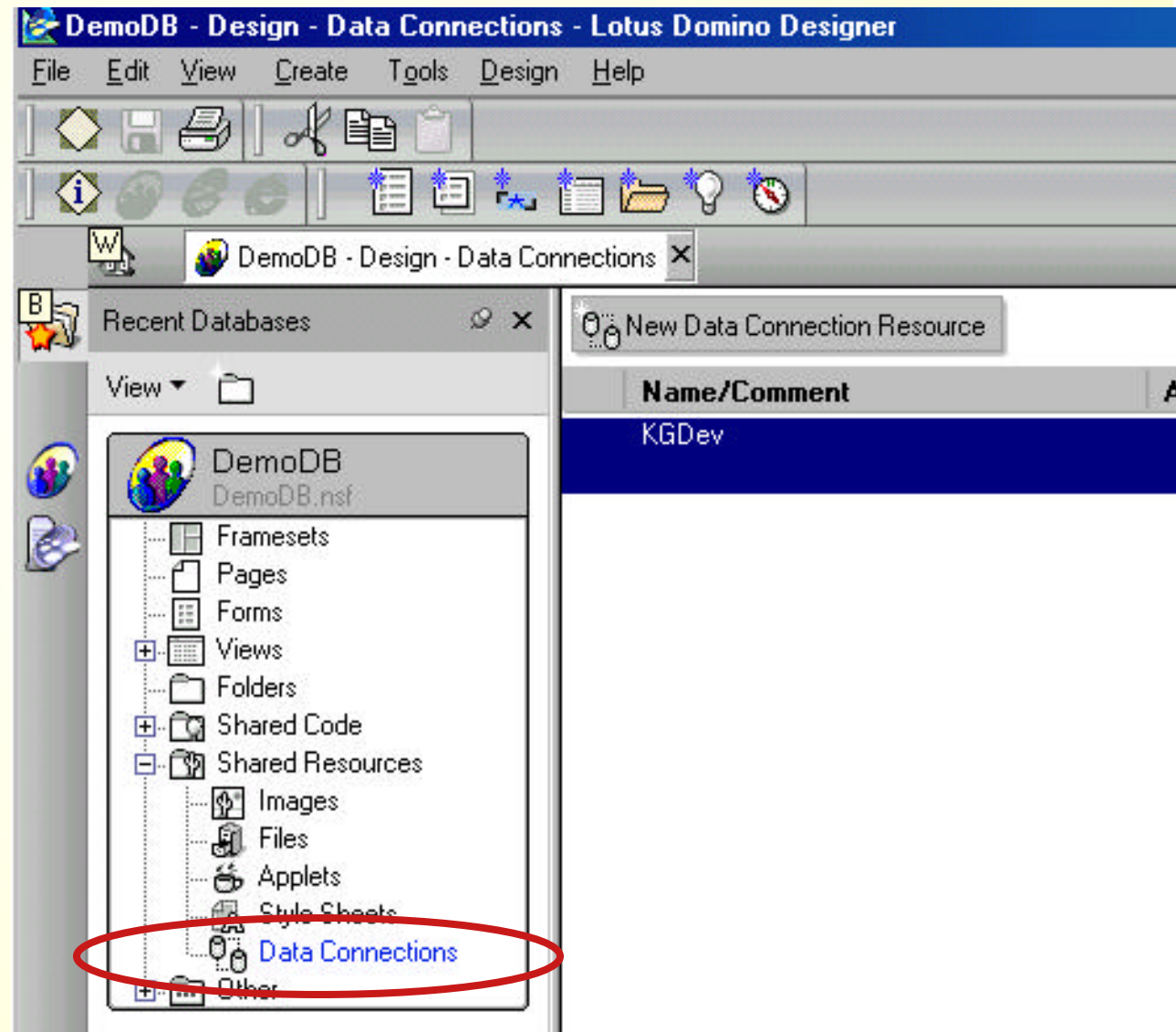
- Still have DECS Administration database to work with connections and activity documents
 - *Provided have not installed and configured LEI 6*

- ▶ ***What changes?***

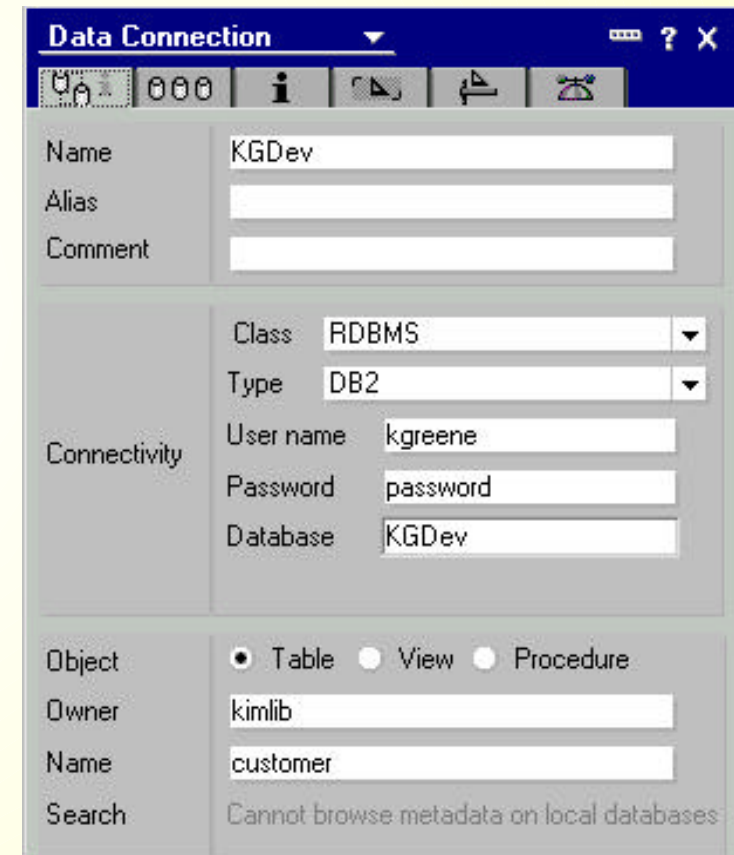
- Can also work with DECS functionality in Domino designer
 - *Using Domino Connection Resources (DCRs)*

- **DCRs bring the technology of DECS to Domino Designer**
- **Create Data Connections to be shared in Domino database**
- **Use Connections (DCRs) to link fields in forms to fields in external data sources**

- **Data Connections are a new shared resource**



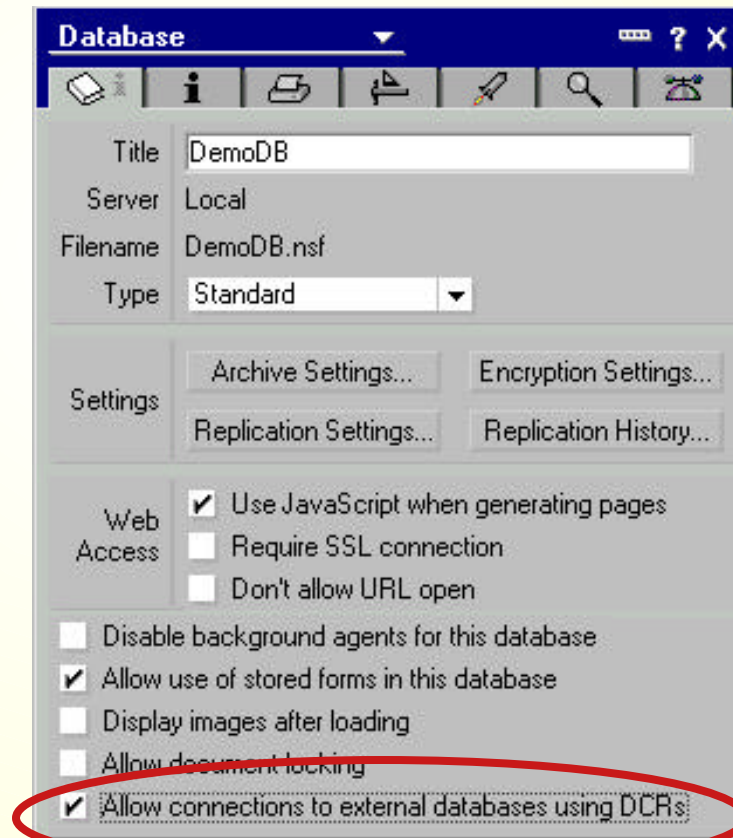
- **Creating a Data Connection Resource**
 - ▶ ***Doesn't require DECS or LEI task to be active***
 - ▶ ***Second tab offers additional settings such as journaling options, connection pooling, ...***



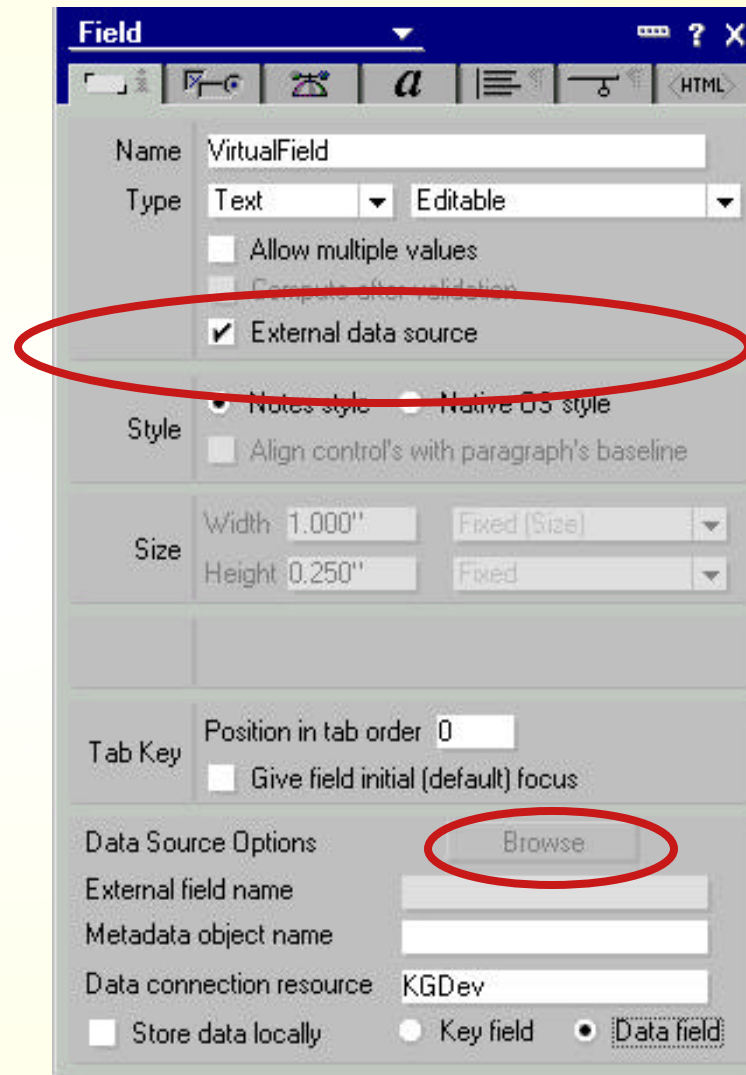
The screenshot shows the 'Data Connection' dialog box with the following fields and values:

Field	Value
Name	KGDev
Alias	
Comment	
Class	RDBMS
Type	DB2
User name	kgreene
Password	password
Database	KGDev
Object	<input checked="" type="radio"/> Table <input type="radio"/> View <input type="radio"/> Procedure
Owner	kimlib
Name	customer
Search	Cannot browse metadata on local databases

- **Enabling DCR support on a Domino database**



- **Creating a virtual field**
 - ▶ ***Work with field properties dialog box***
 - ▶ ***Click "Browse" button to select external field names***



The screenshot shows the 'Field' properties dialog box in Domino Designer. The 'Name' field is set to 'VirtualField' and the 'Type' is 'Text' with 'Editable' selected. The 'External data source' checkbox is checked and circled in red. Below this, the 'Data Source Options' section contains a 'Browse' button, also circled in red. Other options include 'Allow multiple values', 'Compute after validation', 'Notes style', 'Native OS style', 'Align control's with paragraph's baseline', 'Width' (1.000"), 'Height' (0.250"), 'Position in tab order' (0), and 'Give field initial (default) focus'. The 'Data connection resource' is set to 'KGDev' and 'Data field' is selected as the field type.

- **DECS in Domino 6**

- ▶ ***If you install LEI 6***

- DECS Administration database is replaced with LEI Administration database
 - ***Still named DECSADM.nsf***
- Can still work with real-time capability through DCRs
- Real-time functionality is greatly expanded:
 - ***Virtual fields***
 - ***Virtual documents***
 - ***Virtual agents***

LEI 6

- **LEI 6**

- ▶ ***Next major release of LEI, 5733-LEI***

- Release level will track release level of Domino server
 - *LEI 6.0.1 requires Domino 6.0.1*

- ▶ ***No longer an orderable LPP***

- Must order through Lotus Software Distribution process
- Product ID is used solely for providing PTFs

- ▶ ***Rapid application development***

- No programming required

- **LEI 6**

- ▶ ***Real-time data access and data transfer & synchronization***

- Advanced RealTime activities allow external system's data and business logic to be exposed as Domino objects
- Data management activities support transfer & synchronization of data
- Provides single solution for real-time and data management activities

- **LEI 6**
 - ▶ ***Requires Domino 6 server and Notes 6 client***
 - Notes R5 clients and Domino R5 servers can access real-time enabled applications on Domino 6/LEI 6 server
 - ▶ ***Automated utility to migrate DECS R5 and LEI 3x admins to LEI 6***
- **LEI 3.x NOT supported on Domino 6**

- **LEI 6**

- ▶ ***What remains the same?***

- Most previous activities still supported
 - *Direct transfer, replication, polling, archive, command, ...*

- ▶ ***What changes?***

- Addition of "virtualization"
- Integrated credentials
- Server-side browsing
- Multi-platform installer
 - *No more LODRUN for LEI 6*
- User interface improvements

- **New, easier to use Administrator**
- **Ability to browse external systems from the host server**
 - ▶ ***No LEI development client required!***
 - ▶ ***Similar interface to DECS R5***
- **Output parameter support**
 - ▶ ***Write back data from stored procedures***
 - Virtual documents, virtual fields, and virtual agents activities
 - Direct transfer activity

- **Improved Replication activity form and supporting documentation**
- **Multi-platform support**
 - ▶ ***Cross-platform graphical installer***
 - ▶ ***Automated utility to migrate and upgrade DECS R5 and LEI 3x administrators to LEI 6***

- **Multi-platform installer**
 - ▶ ***Install using remote AWT GUI installer***
 - ▶ ***BE VERY PATIENT!!***
 - Do NOT kill the remote AWT window
 - ▶ ***BE VERY PATIENT!!***
 - Install screens may become "buried"
 - ▶ ***BE VERY PATIENT!!***
 - It will work!!

- **LEI 6 components:**
 - ▶ ***The server***
 - Runs on top of a Domino server
 - ▶ ***Lotus connectors***
 - Provide external data connectivity to RDBMS and other external data sources
 - ▶ ***Administrator***
 - Domino application to administer server and all related functionality
 - ▶ ***Log***
 - Log file with details on each LEI activity

- **The server**
 - ▶ ***Runs as a server add-in task***
 - ▶ ***Limited to one LEI server per physical system or LPAR***
 - Cross-platform limitation
 - Future enhancement will remove this limit
 - ▶ ***Requires a Domino 6 server***
 - Will not run on R5

- **Lotus Connectors**

- ▶ **Base connectors**

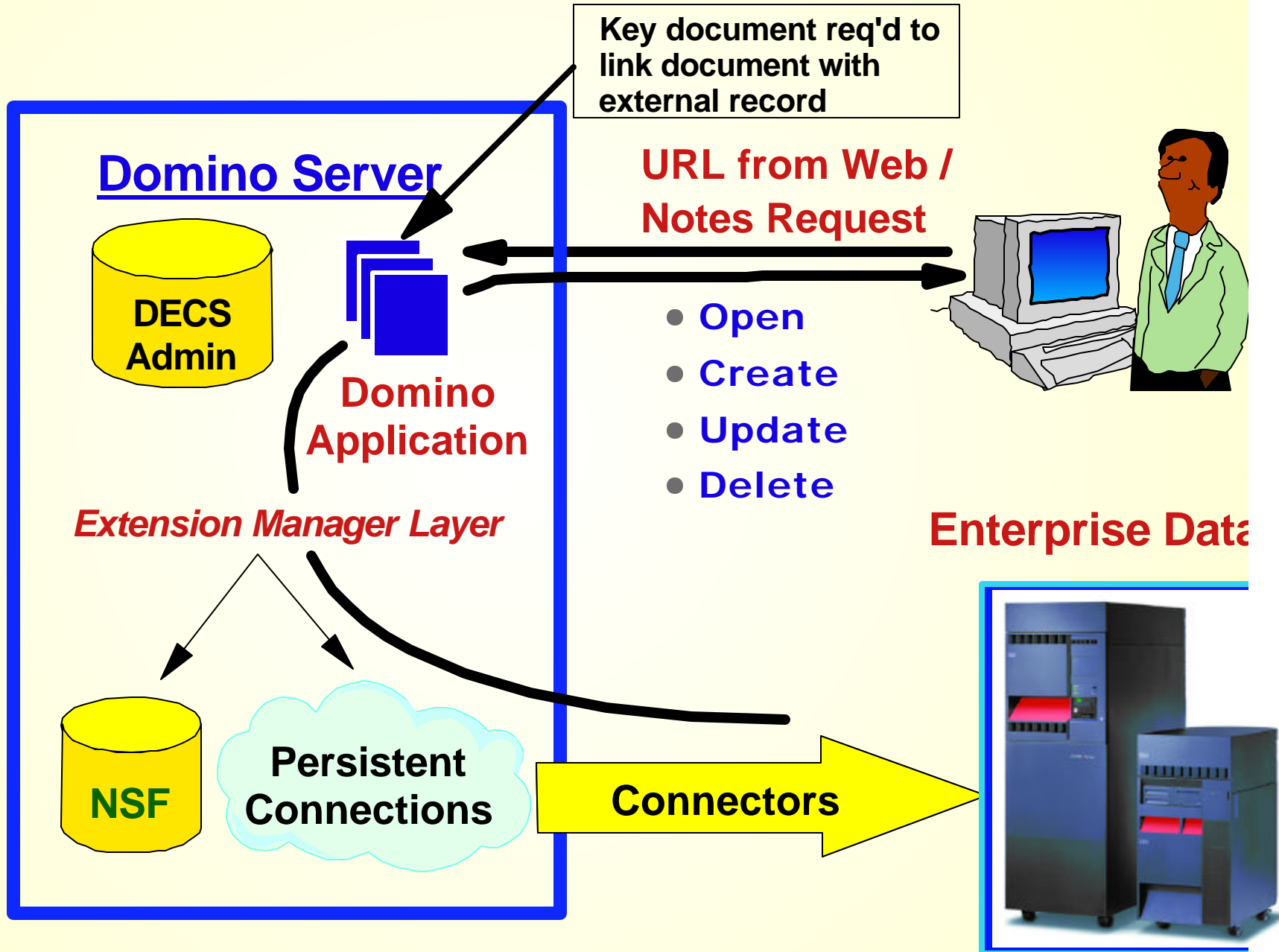
- DB2 (7.x & 8.1)
- Oracle (7, 8i, & 9i)
- Sybase (11)
- OLE-DB (SQL Server 2000 & Access 2000)
- ODBC, File, Text, Notes

- ▶ **Premium connector**

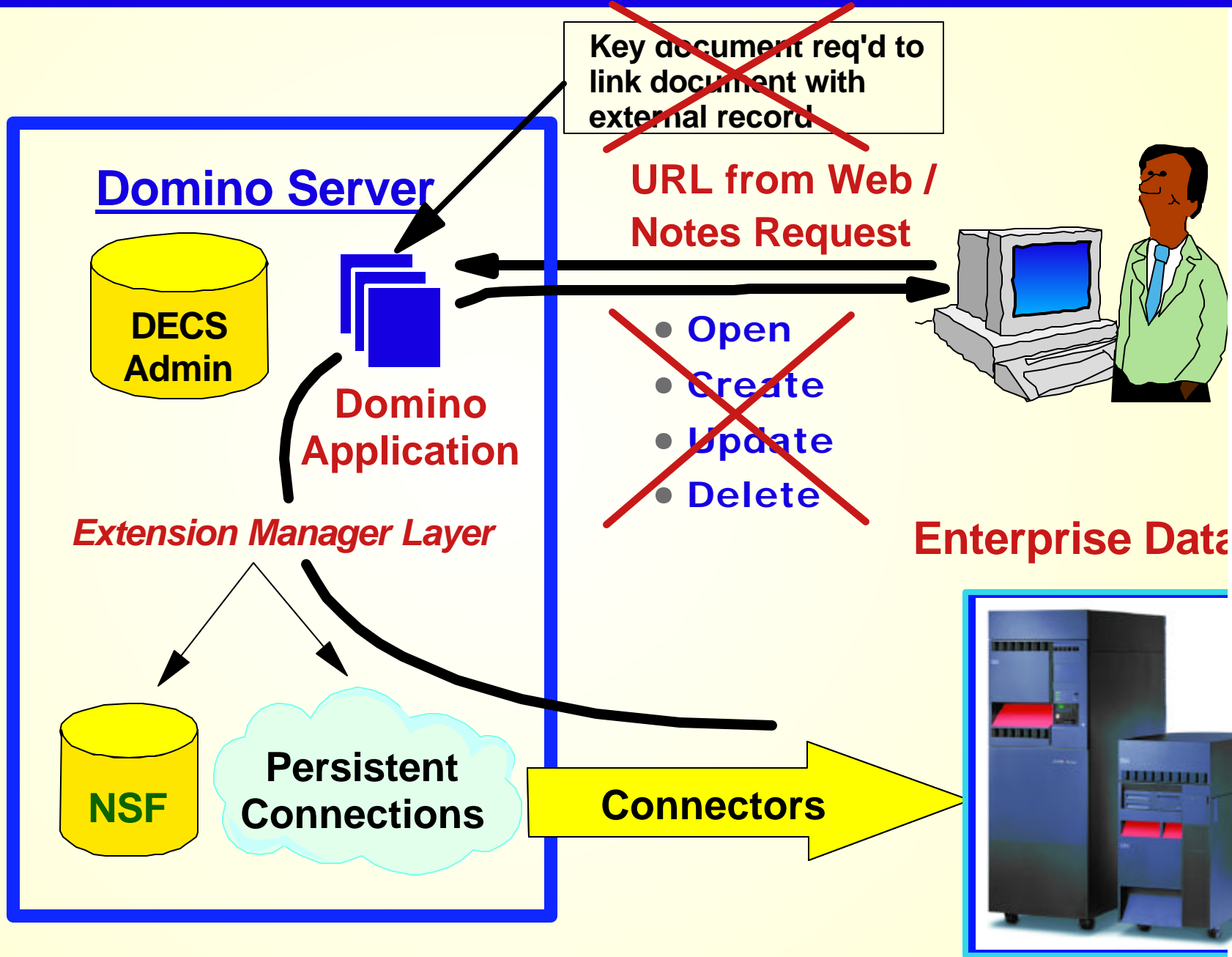
- SAP R/3
 - *Version 1.7 will support Notes/Domino 6 and LEI 6*
 - *Supports same features it did on LEI 3.x*
 - ◆ Does not support new virtualization activities or integrated credentials

- **LEI 6 virtualization**
 - ▶ *Allows external data and business logic to reside in external systems*
 - ▶ *Data appears as if it is Domino data*
- **3 new activities:**
 - ▶ *virtual documents*
 - ▶ *virtual agents*
 - ▶ *virtual fields*

Virtual Fields



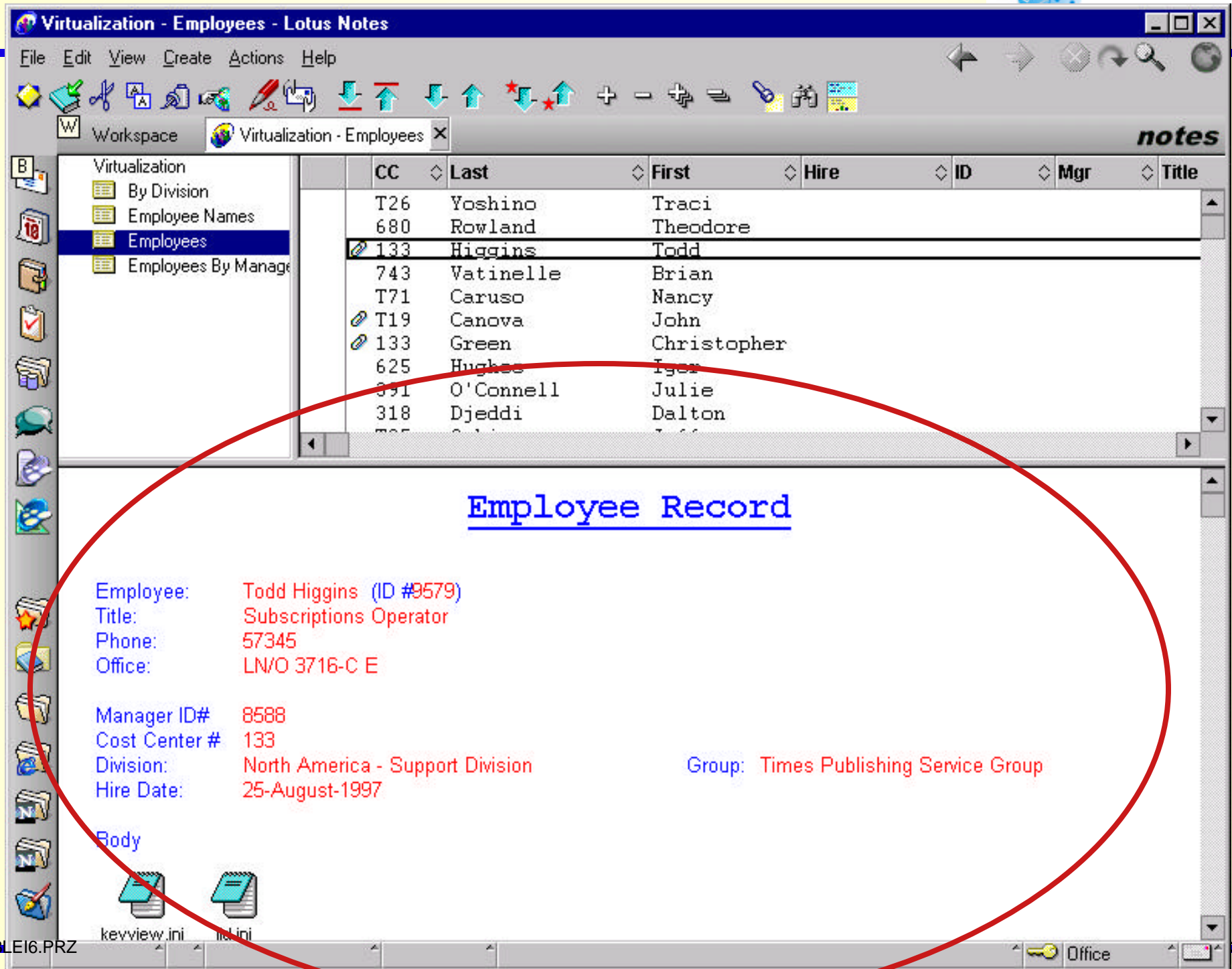
Virtual Documents



- **Virtual documents**
 - ▶ ***Get around problem of having stub documents in Domino database***
 - ▶ ***Allow external records to appear to Domino as if they were actual documents in the Domino database***
 - ▶ ***Can build Domino views over virtual documents!!!***
 - Allows external data to participate in a Domino view

- **Key features**

- ▶ *Document completely stored in external system -- no key document required in nsf*
- ▶ *Notes control fields stored external to the nsf*
- ▶ *Attachments can be stored in native format, but appear as Notes attachments*
- ▶ *Existing external records "virtualized" when activity is first started*



The screenshot shows the Lotus Notes application window titled "Virtualization - Employees - Lotus Notes". The interface includes a menu bar (File, Edit, View, Create, Actions, Help), a toolbar with various icons, and a workspace area. On the left, a navigation pane shows a tree structure with "Employees" selected. The main area displays a table of employee records. A red circle highlights the record for Todd Higgins, which is expanded to show a detailed "Employee Record".

CC	Last	First	Hire	ID	Mgr	Title
T26	Yoshino	Traci				
680	Rowland	Theodore				
133	Higgins	Todd				
743	Vatinelle	Brian				
T71	Caruso	Nancy				
T19	Canova	John				
133	Green	Christopher				
625	Hughes	Igor				
891	O'Connell	Julie				
318	Djeddi	Dalton				

Employee Record

Employee: Todd Higgins (ID #9579)
Title: Subscriptions Operator
Phone: 57345
Office: LN/O 3716-C E

Manager ID# 8588
Cost Center # 133
Division: North America - Support Division
Hire Date: 25-August-1997

Group: Times Publishing Service Group

Body

keyview.ini ini.ini

- ▶ ***MUCH better performance than external key table***
- ▶ ***Need to manually add fields***

Notes
Control
Fields

Item	Data Type
PRODUCT_ID	Zoned(6,0)
DESCRIPTION	Varchar2(30)
LIST_PRICE	Number(8,2)
MIN_PRICE	Number(8,2)
START_DATE	Date
END_DATE	Date
EINOTEID	Binary(9,0)
EIUNID	Char(32)
EIMODIFIED	Timestamp
EINOTEPROPS	BLOB

- **Key field to correlate data record with Notes control field**
 - ▶ ***Built-in utility creates external key table***
 - ▶ ***Put table, indexes, and external table in same library***

**Notes
Control
Fields**

Item	Data Type
PRODUCT_ID	Zoned(6,0)
EINOTEID	Binary(9,0)
EIUNID	Char(32)
EIMODIFIED	Timestamp
EINOTEPROPS	BLOB

- **External data modifications need to be limited to the addition of new records**
 - ▶ ***"Update timestamps" and "deletes" outside of Domino will not be picked up***
- **Notes application should be taken off-line when Virtual Document activity needs to be shut down**
 - ▶ ***Data will not be available to application users***
 - ▶ ***No change from DECS***

- **Plan appropriately for "initial" virtualization of large external data sources**
 - ▶ *Run during off-peak hours*
 - ▶ *NSF gets locked*
 - ▶ *Initialization occurs during activity "start-up"*
- **Index control fields for maximum performance**
 - ▶ *EINOTEID, EIMODIFIED, EIUNID*
 - ▶ *Index *after* initial virtualization completes if:*
 - Manually add fields to file
 - Manually create external table

- Attachment completely stored in external data system
- Virtual attachment has same look and feel as regular attachments to end user
- Feature of Virtual Documents and Virtual Field activities
 - ▶ *Multiple activities can use same attachment table*
- Requires 4 fields for Virtual Documents

- **Virtual agents**

- ▶ ***Allow for direct invocation of stored procedures or other business logic as if they were Domino agents***
- ▶ ***Can be scheduled, triggered, or invoked manually***
- ▶ ***Execute stored procedures in two ways:***
 - Without parameters
 - ***"Run on all documents in database"***
 - With parameters
 - ***"Run on selected documents"***
 - ***Form must contain fields with same names as stored procedure parameters***

Virtual Agents

The screenshot shows the Lotus Notes application window titled 'Virtualization - Employees'. The 'Actions' menu is open, listing various actions such as 'Back From Leave', 'Out On Leave', 'Terminate Employee', and 'Transfer Employee'. The 'Employees' folder is selected in the workspace. Below the menu, a table displays employee records with columns for First, Hire, ID, Mgr, and Title. The record for Todd Higgins (ID #9579) is highlighted. Below the table, the details for Todd Higgins are listed: Employee: Todd Higgins (ID #9579), Title: Subscriptions Operator, Phone: 57345, Office: LN/O 3716-C E.

	First	Hire	ID	Mgr	Title
o	Traci	03/03/1999	12634	50282	Man
d	Theodore	02/14/1994	6145	8730	Da
s	Todd	08/25/1997	9579	8588	Su
lle	Brian	08/05/1996	8178	3079	Re
	Nancy	08/01/1997	50255	12216	Fre
	John	06/01/1998	11784	10358	Un
	Christopher	02/03/1997	8977	8588	Su
	Igor	05/02/1994	6319	1620	Dis
ell	Julie	09/11/1989	2856	4057	Da
	Dalton	01/02/1996	5782	8810	Sys

Employee: Todd Higgins (ID #9579)
Title: Subscriptions Operator
Phone: 57345
Office: LN/O 3716-C E

- **Virtual fields**
 - ▶ ***Past-release realtime support through DECS or LEI realtime activity***
 - ▶ ***Work with field properties in Domino Designer 6***
 - Select that field will be supplied from external data source
 - Define data source metadata
 - ▶ ***New features include Virtual Attachments and Integrated Credentials***

- **Virtual Fields**

- ▶ ***Require key document in nsf***
- ▶ ***Reasons to use over Virtual Documents?***
 - Provide ability to access data from multiple data sources through one form
 - Allows Notes multivalue data to map to multiple records
 - Can be used in conjunction with Virtual Documents to extend these capabilities to Virtual Documents
 - ***Virtual Documents technically serve as key documents for Virtual Fields***

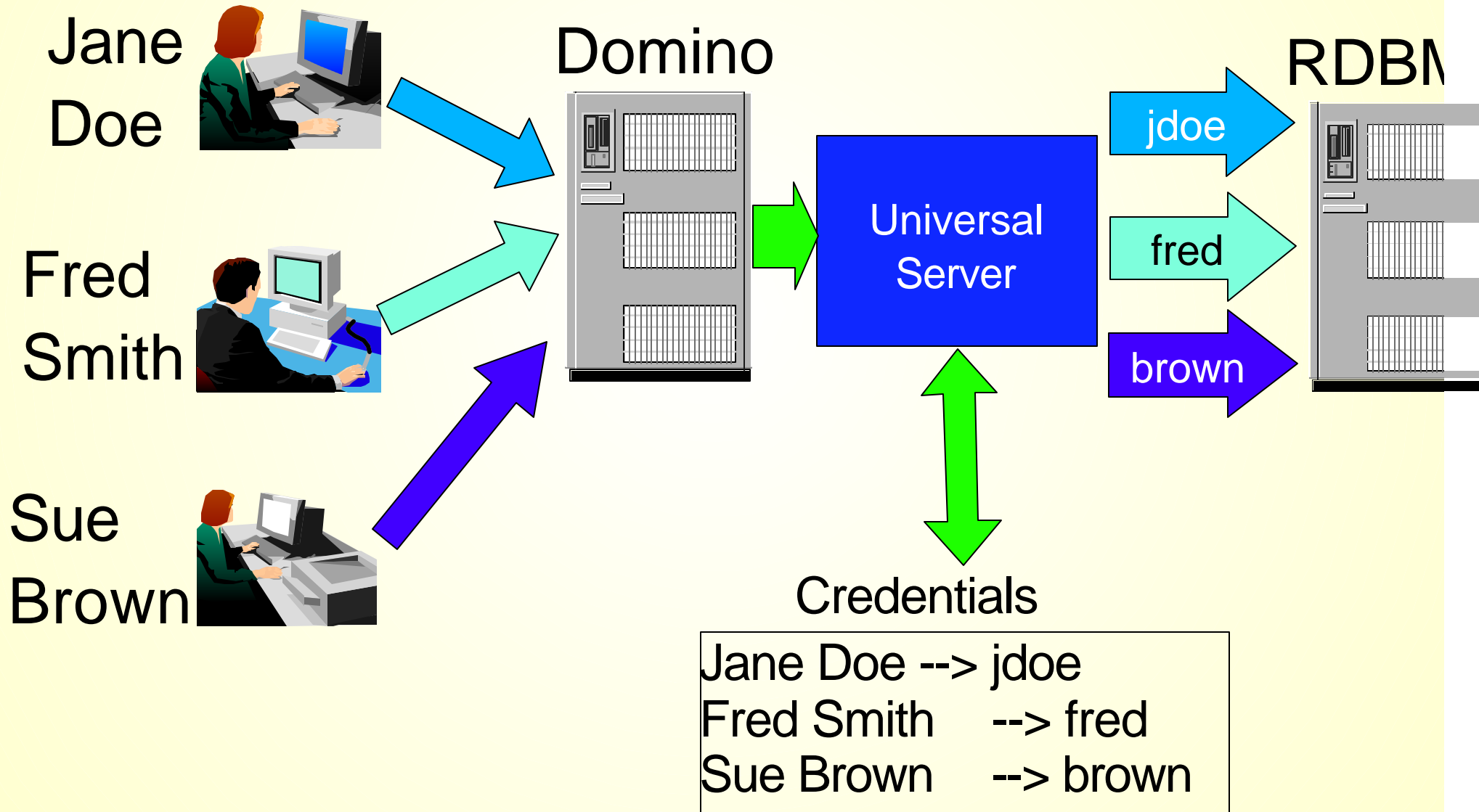
- **Virtual Fields in combination with Virtual Documents**
 - ▶ ***Create Virtual Field activity that monitors same form Virtual Document monitors***
 - ▶ ***Use Virtual Documents to provide keys***
 - Solves keys out of sync problem
 - ▶ ***Populate rest of fields from various data sources and tables***
 - ▶ ***Can resync local copy through replication***

- **Integrated Credentials**

- ▶ ***Store user credentials in Domino database***
- ▶ ***Allows Notes IDs to be associated with back-end user IDs (credentials)***
 - Each user or multiple users can use different sets of external credentials
 - *Associates Notes id or group with external system's user credentials*
- ▶ ***Associated credentials passed to back-end data source to perform operation***
 - Any record changed in the back-end data source can be tracked to the actual user that requested the change

- **Integrated Credentials**
 - ▶ ***Available for use with:***
 - Virtual documents
 - Virtual fields
 - Virtual agents
 - ▶ ***Domino database used to store integrated credential documents***
 - Read access controlled
 - External system password is scrambled

Integrated Credentials



Feature Comparison

DECS R5	LEI 3.x	DECS Domino 6	LEI 6
Realtime	Realtime	Virtual Fields	Virtual Fields
			Virtual Documents
			Virtual Agents
			Virtual Attachments
			Integrated Credentials
	Admin Backups		Admin Backups
	Admin Purge Logs		Admin Purge Log
	Archive		Archive
	Command		Command
	Direct Transfer		Direct Transfer
	Java		Java
	Polling		Polling
	Replication		Replication
	Script		Script

**Classical
RealTime
Activities**

**Advanced
RealTime
Activities**

**Advanced
RealTime
Features**

**Data
Managemen
Activities**

- **LEI 6 brings Domino integration with DB2 to the "enterprise" level**
- **No longer need to keep keys in sync between Domino and DB2**
- **Can record who makes changes in back-end data sources**
- **Significantly extends power of Domino through virtualization of documents**
 - ▶ ***virtual views and attachments***

- **Support for installation to multiple Domino partitions**
- **Performance improvements for Virtual Documents**
- **Read access control for LEI connection documents**
- **** Expanded connectivity options for iSeries ****
- **Dependent activity call maps**

- **LEI 6 on iSeries Residency**
 - ▶ ***April 28 - June 6, 2003***
 - ▶ ***Residency will "officially" be announced after February 24th***
 - See www.redbooks.ibm.com
 - ▶ ***Residency leader will be Deb Landon***
 - dalandon@us.ibm.com

- **www.lotus.com/ei**
 - ▶ *Product information, evaluation copies, articles, white papers*
 - ▶ *White paper: "Advanced RealTime Data Access for the Intelligent Enterprise"*
- **Lotus Developer Domain (LDD)**
 - ▶ *www-10.lotus.com/ldd/products.nsf/products/e*
 - ▶ *Technical articles, support information, downloads, beta information, EI forum*
 - ▶ *Article: "LEI 6 Technical Overview"*

Your Turn!

