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Instructions

Requirements

- ? Java is required for the audio
- ? JavaScript is required to navigate

Click [here](#) to test your browser for compatibility.

Browsers

If you have one of these browsers you should be set.

- ? Netscape Communicator/Navigator 4.0.5 or better
- ? Microsoft Internet Explorer 4.0 or better

You can download this course and take it off-line

This course can be downloaded so you can conveniently take it off-line. You will need to have installed a copy of Adobe Acrobat Reader (you can download this reader by clicking [here](#)). If you want to download the Acrobat files related to this course click here. There are two separate files to download. One contains the foil screens (graphics), the other contains the speaker notes (text). The foil and speaker notes pages have been numbered to help you in putting them together.

Hotlinks

As you go through this course, you will observe, and probably take advantage of, frequent hotlinks that send you to other Web sites for more details about a particular topic. These hotlinks have been compiled in one long list at the end of the course, along with enough of a descriptor to remind you what they are about, and can be accessed by clicking on the LINKS option in the navigator bar.

We think these links are important, but you may prefer to visit these sites at some later point so that, for right now, you can stay focused on the “meat” within this course. You can clip the contents of this “Hotlinks” page into a document file on your local PC drive. Then, at your convenience, you can use these saved hotlinks to explore these topics in greater detail.

The Hotlinks page also has other Web site and reference information that pertains to this course.

Audio

All course pages in this IBE include streaming audio. You will see a button that looks like this in the lower left corner of the course window:

The audio clips will automatically start playing, so you only need to press this button if you want to pause or replay the clip.

You can turn the audio on and off. Click the 'Audio' button shown:

Speaker Notes

Open or close the Speaker Note window with these buttons.

Navigation

These are the general navigation buttons:

- ? Click NEXT to go forward one page.
- ? Click PREV to go back one page.
- ? The TOPICS page lists all the pages in this IBE for quick navigation.
- ? The LINKS page contains the hotlinks to related information.
- ? The TERMS page contains definitions of terminology used in this course.
- ? The FAQ page lists frequently asked questions about the subject.
- ? The QUIZ page asks you questions about what you've learned.
- ? Click EXIT to leave the course.

Enterprise Integration with Domino for iSeries

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Author Information

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Dan Hill is a member of the Lotus Domino team in eServer Solutions organization focusing on Lotus Domino on iSeries servers. He is a Certified Lotus Professional and is also certified as a Lotus Domino R4 and R5 Principal Application Developer . Dan is involved in helping Solution Developers integrate their iSeries applications with Lotus Domino, from both an iSeries Solution Developer perspective and from a Lotus Solution Developer perspective. Prior to his present responsibilities, he worked in IBM Rochester Development creating Lotus Domino and Java tools for other IBM developers to use in the construction of OS/400.

Course Prerequisites

You should be familiar with:

- iSeries operating environment (OS/400)
- Basic IBM terminology
- e-business concepts and terminology
- Programming environments
- Basic Domino concepts and terminology

Course Prerequisites

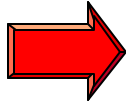
Hi there, and welcome to “Enterprise Integration with Domino for iSeries: Native Domino Connectors,” an Internet-based Education course. First, let’s review the course prerequisites. We will assume that you are familiar with the IBM @server™ iSeries™ operating environment, as well as basic IBM® terminology. Therefore, many terms will not be further explained in this learning course. However, we do provide a glossary at the end of the course that is a review of many acronyms and terms used throughout this material. Should you want to access the glossary while taking the course, click on the link provided in the navigation bar.

Additionally, you should have a general understanding of how the Internet works and what tools and techniques are widely available today to address consumer needs. The majority of this material assumes a basic understanding of Web concepts. Additionally, to get the most out of this course and comprehend the benefits presented for Web-facing, you should also understand how programming environments work.

If at any point, you wish to jump back to a previous section of this course, simply click on the “Agenda” hotlink in the navigation bar, and then click on the segment you want to review.

You will also be occasionally quizzed on the material you have learned, so that you can get a sense for your level of understanding before moving on to new topics. Then, at the end of the course, you will have the opportunity to take a final test regarding all the material.

Agenda



- **Value of Domino**
 - Case Study: Corning Data
 - Lotus' Strategy
- **Connectors**
- **Domino Tools**
 - LEI
 - DECS
 - Lotus Software Extensions (LSX)
 - @DBCommands

Overview/Agenda

Here is the agenda for this course, which will start with an overview of the strong value Domino™ can bring you as an integration platform. We will briefly discuss the overall strategy for Lotus® as it continues to move into the position of being a premier development environment for the integration of Web, back-office, and collaboration applications.

Then, we will review the Domino-based data and business logic Connectors and the native Domino tools that use them.

Please note that there is a closely-related Internet-based Education course, Enterprise Integration with Domino for iSeries: Java, XML, and Other Tools, that talks about the Java® and eXtensible Markup Language (XML) technologies, as well as miscellaneous other access methods, that can also be used for your integration tasks. The Java and XML tools continue to work more and more seamlessly with Domino. The emphasis, in this sister course, on these two technologies is important since they are clearly being embraced by businesses around the world as valuable “go-to-Web” vehicles.

The Value of Domino Integration...



The Value of Domino Integration

Let's set the stage by reviewing the tremendous business value of the Domino product.

Not only does Domino provide a world-class messaging infrastructure that lets users and applications send anything to anyone, it also offers a rich application development environment. Developers can use Java, JavaScript, or Lotus' own LotusScript, Domino Enterprise Connector Services (DECS), or Lotus Enterprise Integrator for Domino (LEI). All of these options are ideal for developing Web applications. Each offers special advantages depending on the particular Domino and back-office environment.

Domino is an application server and an HTTP server. Users can access Domino applications using a Web browser. Domino also has unmatched replication capability, making it perfect for today's distributed workforce where, more and more, workers are demanding the capability of disconnecting and yet continuing to work off-line.

As you look at the broad list of tools, features, and functions (shown here) that Domino offers; it is important to understand the big picture — pure and simple, the biggest value of Domino is its ability to integrate.



N-tier Applications

The importance of application integration is essentially self-evident, as the average mid-sized company in America today “hangs” an average of 10-to-15 additional applications onto its core ERP set.

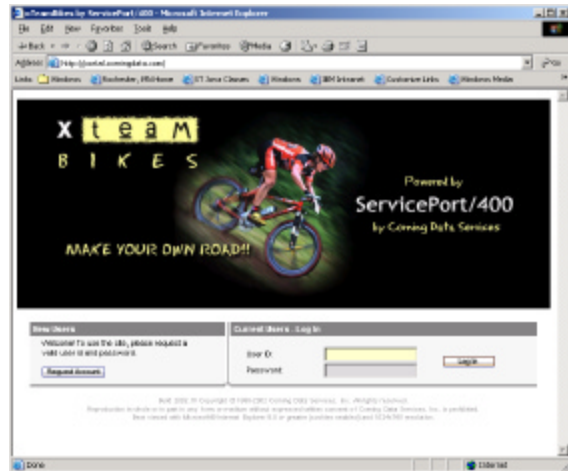
Your salesforce needs to have access to accurate, timely information on pricing, inventory, ship dates, and delivery schedules. Your human resource application needs to automatically update profiles, instantly, based on changes an employee makes via a Web-based benefits enrollment system.

Customers need to use the Web to track the status of their orders, and they need to view future production schedules for their budgeting needs. And, as you already know, there are so many more examples of the need for the integration of disparate application sets — both within and external to your organization.

Domino allows you to do all of this. Domino can easily integrate with your Enterprise Resource Planning (ERP), Customer Resource Management (CRM), and Supply Chain Management (SCM) applications. In essence, you will be building a Domino front end to these legacy applications to quickly and elegantly Web-enable them.

Case Study: Corning Data

- <http://portal.corningdata.com/>
 - ▶ User ID: **demouser**
 - ▶ Password: **password**
- **Calls Stored Procedures**
 - ▶ written in RPG



Case Study: Corning Data

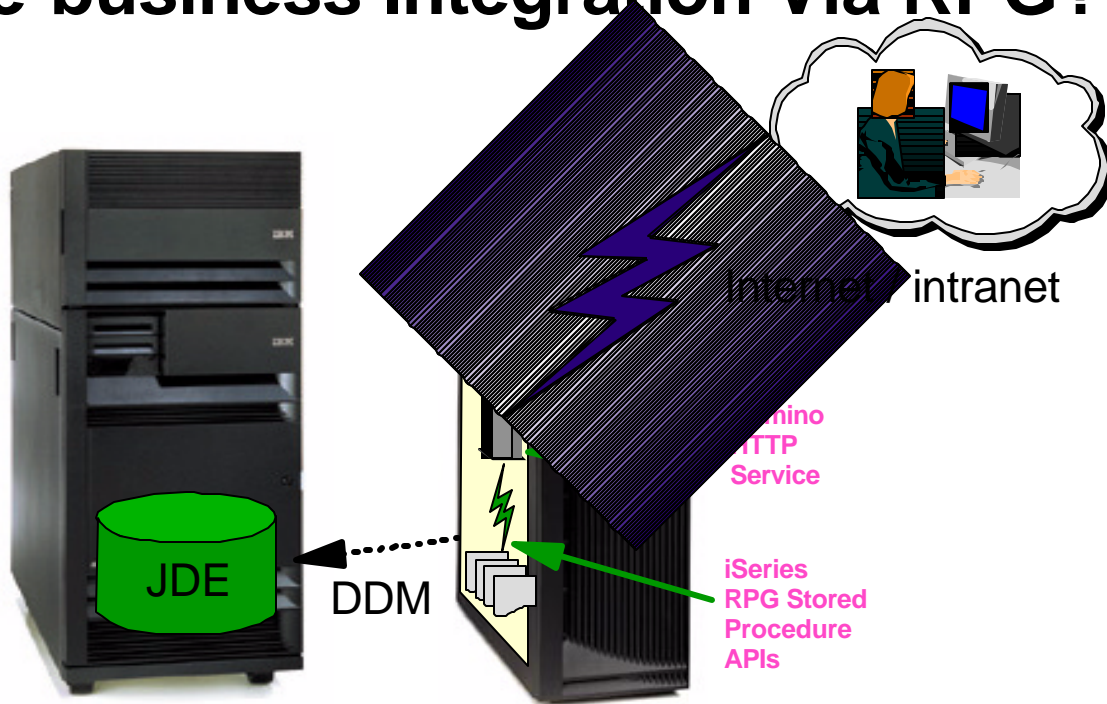
You can actually view and play with a short case study that illustrates the power of Domino to deliver integration quickly to an organization that is already quite entrenched in a group of distinct, “unfriendly to each other,” application sets.

All you have to do is visit the Corning Data demo site (see the URL on this chart). (You can also find a link to this in the “Hotlinks” section of this course.) You will notice that you can move around within this Web-linked set of applications with ease. And, you can see that the types of information being displayed would be highly relevant to the typical manufacturer or distributor — offering a competitive edge that would be hard to surpass.

The “Corning Data Services” application is a Domino Web portal that is interfaced to J.D. Edwards® World™ software — which is a widely-installed, green screen ERP system. Domino uses DDM to get data from remote server via Stored Procedures that are written in RPG.

[NOTE: As you probably are already aware, Stored Procedures are ubiquitous with the iSeries platform. So, it is highly relevant that this demo shows how expertly Domino can utilize this legacy mechanism.]

e-business Integration Via RPG?



e-business Integration Via RPG?

Let's talk a little more about what is going on behind the scenes at the Corning Data demo site just mentioned in the previous chart.

This is a schematic of the Domino architecture that is using the HTTP service port to act as a conduit between the Web user and the J.D. Edwards database. As you can see, a user comes in through the Domino HTTP server. Domino then uses LotusScript Data Object (LS:DO) to call RPG (that is, to call an RPG Stored Procedure) which queries the J.D. Edwards database and returns a result set. Domino then displays the result set back to the user via an HTML page.

[NOTE: The LotusScript Data Object (LS:DO) provides full read and write access to external ODBC data sources using the complete control and flexibility of a structured programming language.]

Lotus Enterprise Integration Strategy

- Lotus EI charter
 - ▶ Connect Domino with the world
 - ▶ Enable enterprise collaboration
- Our philosophy
 - ▶ Simplify common tasks (visual mapping)
 - ▶ Ease complex tasks (programmatic)
 - ▶ Deliver a consistent, unified architecture



Lotus Enterprise Integration Strategy

In the context of Domino application development, "EI" refers to the tools and technologies for integrating applications and systems on the Domino platform.

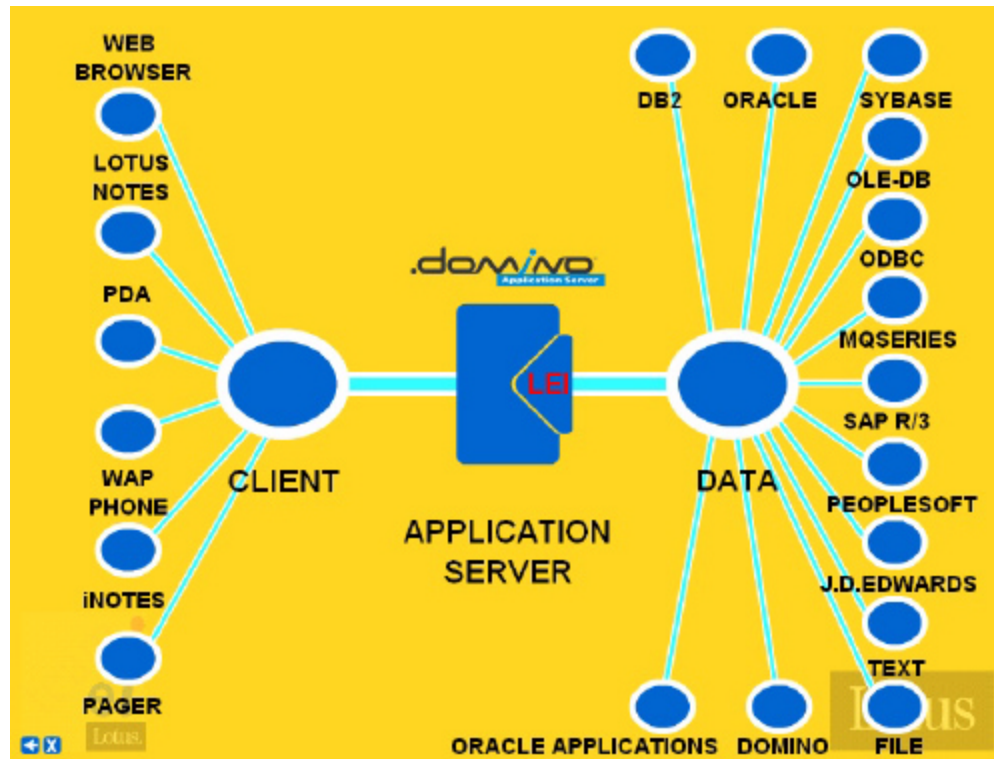
The goals of Lotus with this integration toolset are to:

- ✍ Increase the power of the Domino application development platform.
- ✍ Enable enterprise system collaboration — or deeper integration. It is important to understand that Lotus tools, today, allow integration between different enterprise systems, beyond Domino applications themselves. In other words, Domino becomes the conduit to connect all sorts of dissimilar application sets. (We are being redundant here because this message is integral to this course.)

As Lotus works toward higher and higher standards with these goals, it is important to ensure that Domino maintains a consistent, unified strategy and architecture, thus making common tasks simple and complex tasks easier.

Going forward, Lotus' strategy focuses on using a common connector API and architecture. This will allow multiple tools (such as: DECS, LEI, LotusScript, and Java Domino Connector classes) to use those common connectors for access to enterprise sources. Lotus wants to have a common toolset, across multiple platforms, to access multiple backend data sources.

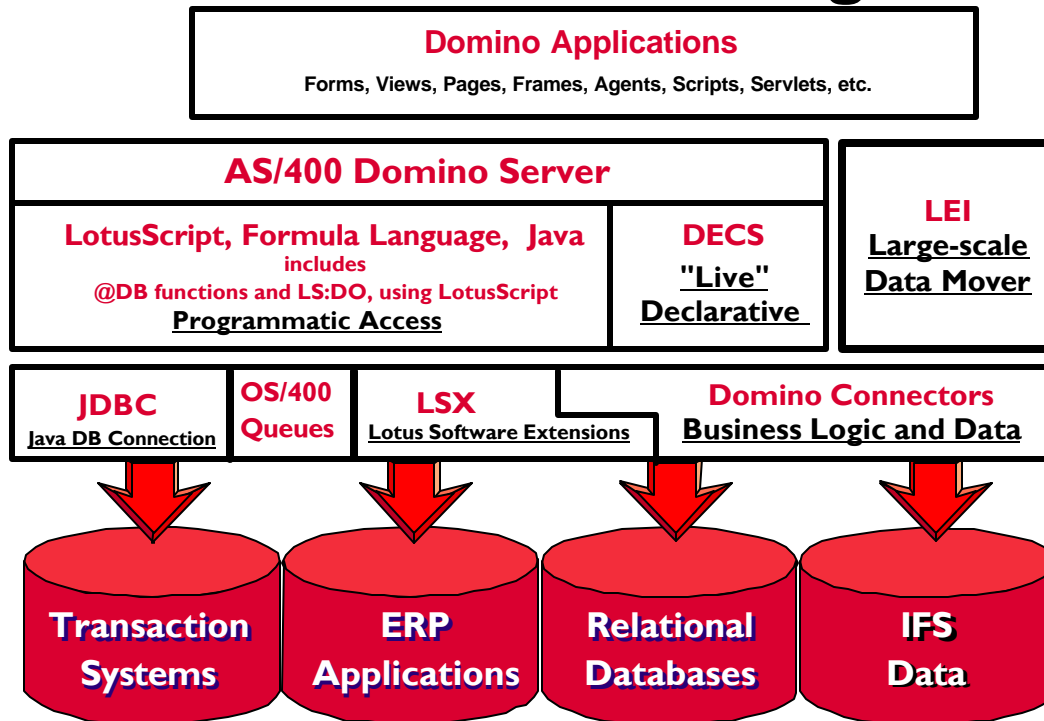
Lotus Enterprise Integration Strategy (continued)



Lotus Enterprise Integration Strategy (continued)

Lotus's strategy is to provide full access, via Domino, from any client to any data.

Domino for iSeries Integration



Many choices

Domino for iSeries Integration

A variety of enterprise integration tools have become available, over time, for Domino on iSeries, including @functions, LC LSX, LS:DO, DECS, LEI and Java classes. As you can see, there are many choices for integration on an iSeries server. We will talk about many of these as we continue forward in this course.

Mini-quiz

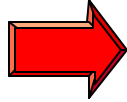
1. The biggest value of Domino...
 - ☐ Is to integrate back-office, collaborative, and Web applications.
 - ☐ Is to provide collaboration technologies.
 - ☐ Is to deliver e-mail reliably as an enterprise scales in size and e-mail volume.
 - ☐ None of the above

2. Domino quickly builds a Domino front end to ERP, CRM, and SCM applications for access over the Web.
 - ☐ True — Correct.
 - ☐ False

3. A variety of enterprise integration tools have become available for Domino on iSeries...
 - ☐ @functions & Java
 - ☐ LC LSX & LS:DO
 - ☐ DECS & LEI
 - ☐ All of the above

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- **Connectors**
- Domino Tools
 - LEI
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 - @DBCommands



Connectors

So, now we are ready to get into the meat of this course by talking about the Domino Connectors, of which there are actually quite a few options.

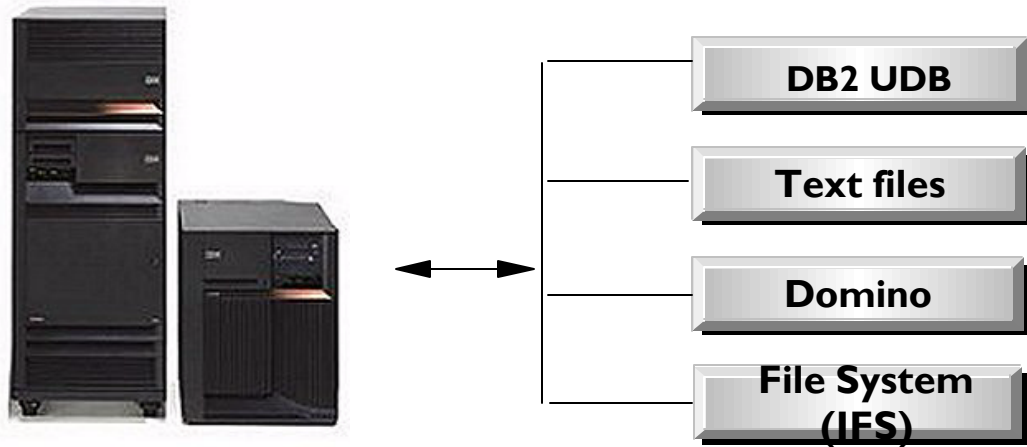
Domino Connectors

- Two Categories of Domino Connectors
 - ▶ Data Connectors
 - ▶ Business Logic Connectors
- Connectors are Service Programs in Qnotes Library
 - ▶ Processing: connections, login authentication, and data translation across enterprise data sources
- Developed Using Vendor-Supplied APIs
 - ▶ DB2 UDB CLI, SAP RFCSDK, Lawson, etc.
- Used by Domino Enterprise Integration Tools:
 - ▶ Domino Enterprise Connection Services (DECS)
 - ▶ Domino Connectors (LSX)
 - ▶ Lotus Enterprise Integrator (LEI)

Domino Connectors

Connectors handle the login authentication, connection pooling, and data translations across the different target data sources. Connectors are service programs that reside in the QNotes library. They are implemented as Dynamic Link Libraries (.dlls) on other platforms. There are two types of connectors: data logic and business Logic. The data connectors allow you to access the raw application data directly. You can update and manipulate the data in any way you want — without the cumbersome nature (and the protection) that is offered by using the application's own data manipulation procedures. (This, obviously, is a double-edged sword.) The business logic connectors use vendor-supplied APIs to access data. You do not manipulate the raw data directly. Both of these connector types are used by several Domino tools like DECS, LEI, and the LotusScript Extension for Domino Connectors (LC LSX).

Domino Data Connectors on iSeries



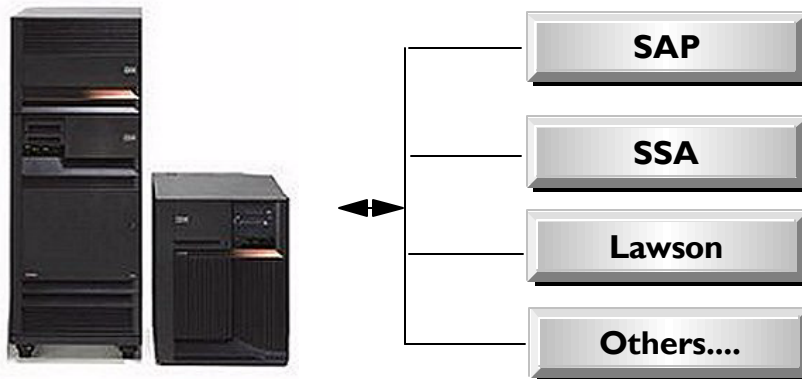
Domino for iSeries servers

Domino Data Connectors on iSeries

Data connectors come standard with Domino for iSeries to provide access to DB2 UDB for iSeries files, text files, the Domino databases, and the Integrated File System (IFS).

[NOTE: You get the text file connector when you load LEI.]

Domino Connectors — ERP Vendors



Domino for iSeries servers

Domino Connectors — ERP Vendors

Several IBM ERP Business Partners who figure prominently in the iSeries space have built their own "premium" connectors (which are generally purchased separately).

Lotus Connector for SAP R/3 uses the SAP Remote Function Call (RFC) interface, which reads and writes R/3 data through the application — thus preserving the integrity of the application logic and processes for accessing underlying SAP database tables. Lotus Connector for SAP R/3 enables SAP backend data to be accessed from DECS, LEI, and Lotus Connector LSX. Lotus Connector for SAP R/3 is available today for Domino Release 5. SAP is also planning to release Version 1.7 of its connector to support Notes/Domino 6 and LEI 6. SAP has a planned availability of its updated connector for Domino 6 in late December 2002. *[NOTE: A beta of this product is available now as a download from the Web site listed in the "Hotlinks" section of this course.]*

J.D. Edwards breaks logical units of work into groups called business functions. The connector works with Domino to give Domino applications access to a subset of these

business functions. By using the business functions, you are insulated from changes to the underlying ERP architecture. However, this connector will not be supported in Domino 6.

The SSA eBPCS Connector has been developed for the Windows® NT and iSeries platforms by IBM, Total Solutions Group (TSG), and SSA. The eBPCS Lotus Connector targets SSA's eBPCS 6.1 ERP system. SSA's Semantic Messaging Gateway (SMG) software, which is a required part of the solution, bridges the connectivity between eBPCS and the Lotus Connector. The eBPCS Lotus Connector communicates with SMG software via XML-formatted messages, which, in turn, transacts with eBPCS to perform the desired function. Using this interface, Domino has access to a broad range of eBPCS functionality, from simple functions (such as customer and part lookups) to more complex operations (such as the creation of customer orders, purchase orders, shop orders, and manufacturing routings). The SSA Domino Connector will work with the LC LSX programming interface and can also be utilized through DECS and LEI. The SSA Domino Connector is part of SSA's maintenance release of eBPCS V6.1.01. SSA currently provides its connector for Domino Release 5, but is in the process of planning a release schedule for a connector on Domino 6.

Lawson has created its own connector that serves as a front end to all of its ERP applications. This connector was built using DECS. (We will talk more about DECS later in this course.) However, Lawson has announced an "end-of-life" for its current Domino connector product and is not planning to announce any connector support for Domino 6. This means that as Lawson ERP users migrate to Domino 6, they will be looking to "write their own."

Other "premium" connectors are also available. And, additional connectors are in the works.

Lastly, you can use Lotus Domino Connector Toolkit to build your own connector(s). The Domino Connector Toolkit allows external parties to create additional object classes with unique properties and methods. The toolkit is a C API that supports both building and using connectors. The toolkit provides connector template LSX source code used for building connectors.

Mini-quiz

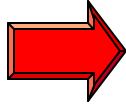
1. There are two types of connectors...
 - ☐ DECS and vendor-supplied APIs
 - ☐ ERP and collaborative
 - ☐ Data logic and business logic
 - ☐ None of the above

2. Connectors handle the login authentication, connection pooling, and data translations across the different target data sources.
 - ☐ True — Correct.
 - ☐ False

3. There are several IBM ERP Business Partners that have built their own Domino connectors. Some of these software providers are:
 - ☐ SAP
 - ☐ J.D. Edwards
 - ☐ Lawson
 - ☐ All of the above

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 - Java
 - XML/DXL



Tools

This next section covers the wealth of tools that are available to Domino integration designers and developers, many of which use the Connectors just discussed. As alluded to when we reviewed the course agenda, this section is rather long, owing in large part to the detailed coverage of Java and XML. So, take a deep breath and let's get started.

Lotus Enterprise Integrator

- **LEI Server** — for scheduled or event-driven, high-volume data exchange or synchronization across Connector sources:
 - Multithreaded, Multitasking, Multiprocess
 - International Character Transfer support
 - Operates as Domino Server Add-in Task
 - Native Connectivity to Enterprise Data
 - Upgrade to NotesPump
 - No programming required!
- **Available as OS/400 Licensed Program**
 - 5769LNP
 - LEI 6 will be 5733LEI

Lotus Enterprise Integrator

Next, let's look at some of the Domino tools that use Domino Connectors.

Lotus Enterprise Integrator (LEI) (and DECS, for that matter) are non-programmatic tools. This means they do visual mapping of fields that exist in Domino applications to fields that exist in the various backend data sources. In essence, as mentioned earlier, they use the Connectors to connect to the different data sources.

LEI allows for the high-volume transfer and synchronization of data. LEI is a server-based "data distribution" technology. Lotus issued this product to provide Domino users with a forms-based, "no programming required" method to move information between both legacy and relational server sources and Domino applications.

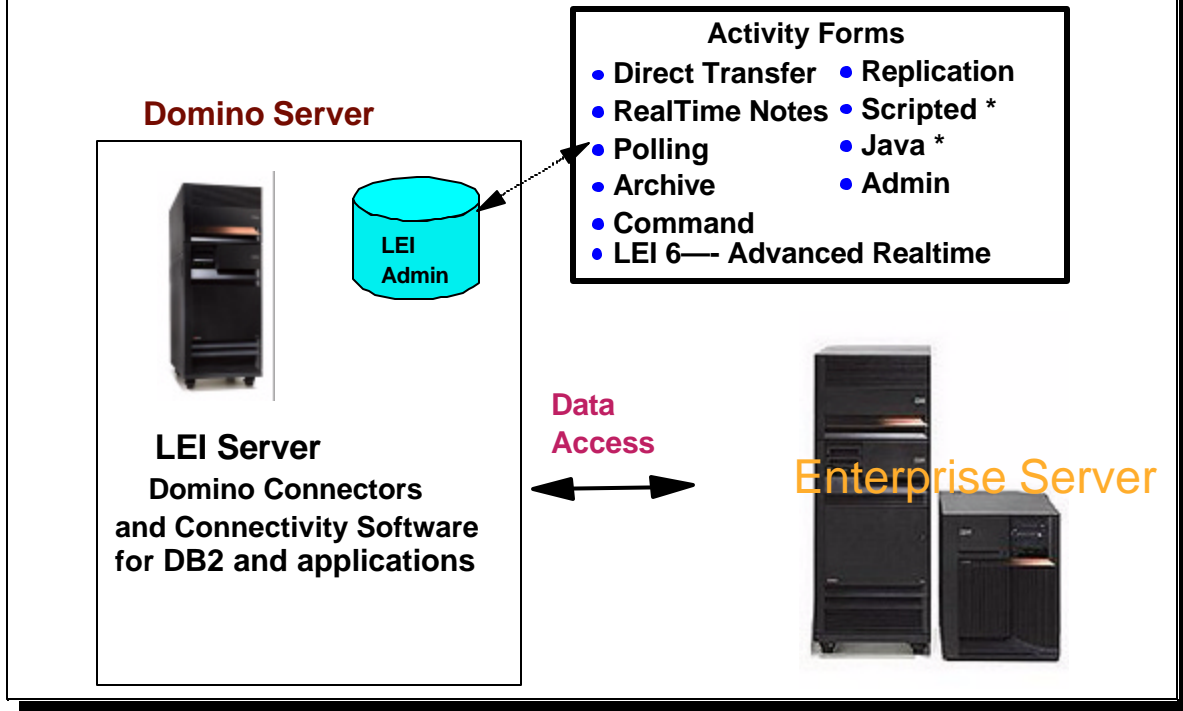
LEI activities can be either a batch or scheduled process. LEI is designed to support the multithreaded and multitasking needs evident in today's aggressively and efficiently designed applications. LEI has support for international character transfers. And, in addition, LEI provides LotusScript and Java connectivity classes, properties and methods. This enables Domino users to run scripted data transfer operations managed by LotusScript or Java Server programs.

LEI 6 is a new product offering that will fill many of the gaps of DECS and LEI as they exist in R4.6 and R5. LEI 6 contains a new technology called virtualization (virtual fields, virtual documents, and virtual agents) that makes integration with backend data stores seamless by eliminating some of the synchronization challenges that existed with the earlier versions of LEI (and DECS). The new LEI 6 is discussed at length in a recently updated white paper, entitled "Enterprise Integration with Lotus Domino for iSeries." You can find this white paper by going to the "Hotlinks" section of this course.

[NOTE: LEI is an OS/400 Licensed Program: 5769LNP. LEI 6 is 5733LEI.]

LEI Functionality — Activities

Scheduled and Event-driven Data Integration



LEI Functionality — Activities

LEI uses forms to manage the transfer of data. This is an efficient way to connect to and move data between systems. Administrators populate Activity forms within the LEI Administrator management application. The server engine polls the database, and carries out the instructions recorded to the Activity document. It is important to note that Domino does not need to be a source or destination within transfer activities.

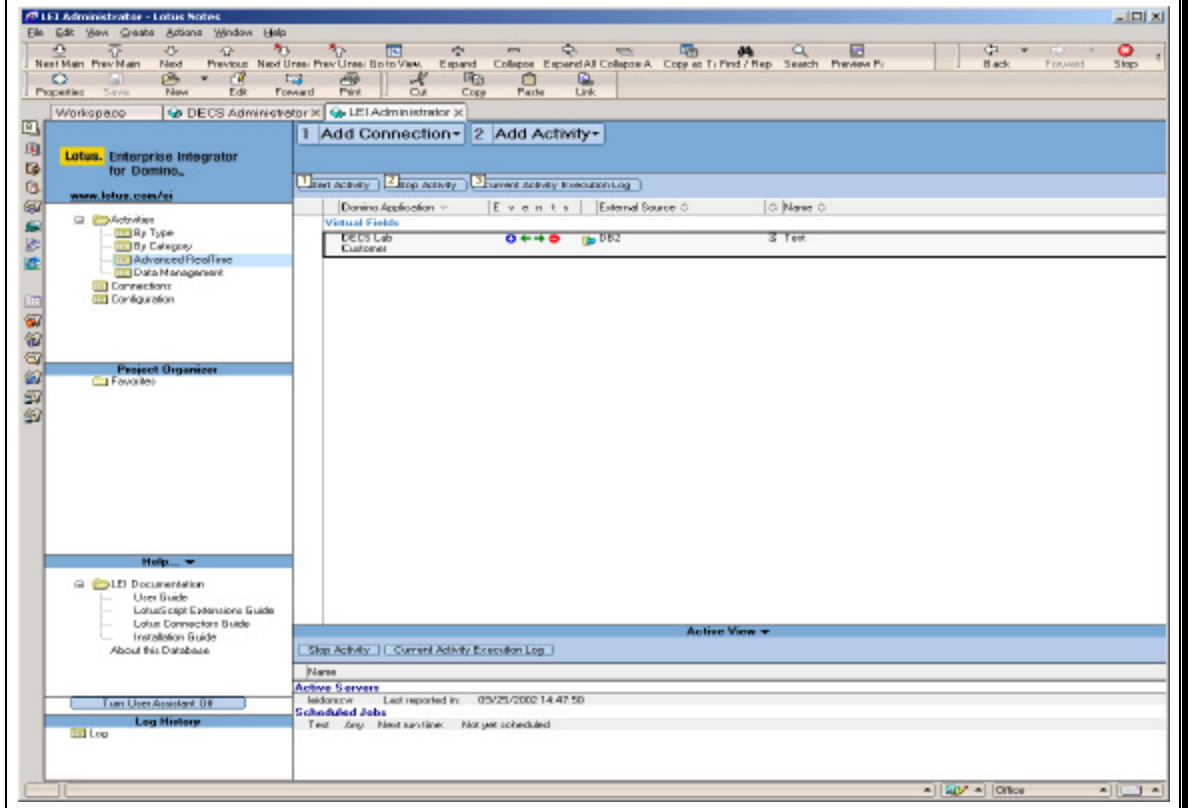
Activities are operations the server processes. Administrators merely fill in Activity forms and the server carries out the instruction according to a set schedule identified within the Activity. Scripted and Java Activities identify named agents that should be executed by LEI on a scheduled basis. Different Activities are available for use by LEI:

- ✍ **Admin-Backup** — This Activity backs up the Administrator database data.
- ✍ **Admin-Purge Log** — This Activity purges the LEI logs.
- ✍ **Archive** — This Activity archives a database.
- ✍ **Command** — This Activity executes an action against a database.
- ✍ **Direct Transfer** — This Activity transfers data from one database to another.
- ✍ **DPROPR** — This Activity transfers data from a DataPropagator Relational (DPROPR) Consistent Change Data (CCD) staging table in a relational database to any LEI-supported database.

- ✍ **Polling** — This Activity polls a database to see if a specified condition exists, and, if so, executes an Activity.
- ✍ **RealTime Notes** — This Activity catches and handles Notes events as they occur.
- ✍ **Replication** — This Activity synchronizes data in different databases.
- ✍ **Scripted** — This Activity executes an Activity whose data sources and function are defined by a LotusScript script.

[NOTE: LEI 6 and Advanced RealTime will be discussed in greater detail as this course proceeds.]

The LEI User Interface



The LEI User Interface

LEI takes complex tasks and makes them easier through an intuitive, task-oriented user interface (which is shown here as a screen capture). As mentioned, the LEI 6 user interface was updated with the goals of clarification and simplicity in mind. A consistent look-and-feel among all the LEI components makes navigation and development intuitive and easy. You can now control both data management and RealTime activities from a single location.

As you can see here, there are views for the defined connectors and activities, as well as links to "Help" documentation and the log.

Direct Transfer Activity

Direct Transfer from DB2 S105W16M (using "hilld") - QIWS.QCUSTCDT to LEITest.nsf - Lotus Notes

File Edit View Create Actions Text Window Help

Attach Import Bold Italic Perm Pen Spacing Align Center Indent

Properties Save New Edit Forward Print Cut Copy Paste Link

Workspace DECS Administrator LEI Administrator Direct Transfer from DB2...

1 Save & Exit 2 Author Privileges

Direct Transfer Activity Author: Dan Hill/COMMON

Current Status: Not Enabled
Last Run Time: 03:08:07 PM Today

Identification

Name: LEI Test

Source Edit Connection

Connection: DB2 S105W16M (using "hilld") - QIWS.QCUSTCDT

Table: QIWS.QCUSTCDT
(Optional - Used by Map Fields)

Target Edit Connection

Connection: LEITest.nsf

Form: Test

Mapping:

☒ Automatic
☐ by Name
☐ by Position

Select Statement: select * from QIWS.QCUSTCDT

Direct Transfer Options **Activity Execution Options** **Scheduling**

Precision Options **Source Data Options** **Target Data Options** **Performance Options**

Data Truncation Options:

☐ Generate Error for any Data Loss
☒ Allow Precision Loss Only
☐ Truncate Data When Necessary

Other

Category(s): LEI Test

Comments:

Direct Transfer Activity

This Direct Transfer Activity has been defined to take data from a DB2 UDB database table and move it into a Domino database. The "Map Fields" button can be used to interactively view and select Connector metadata when defining Activity forms.

LEI MetaConnectors

- Optional Functions for Transfer Processing
- Declarative functionality (LEI forms)
 - ▶ Called within Activity-defined processes
 - ▶ Operate on Connector result sets during transfer — DataTransforms
 - **Collapse/Expand** — collapse [n] records, expand result set to single Domino form
 - **Order** — synchronize ordering of result sets
 - **Metering** — record data traffic across Connector source
 - **Connection Broker** — authenticate individual user to Connector backend
 - ◆ not available in LEI 6, function replaced with Integrated Credentials support
 - ◆ Advanced Realtime — integrated credentials
 - **Trace** — capture trace data
 - ◆ new in LEI 6

MetaConnectors

MetaConnectors are a patented Lotus technology that encapsulates the most common transformations that occur (in conjunction with Activities) and encapsulates them into Forms-based components.

The MetaConnectors provided with LEI 6 are:

- ✍ **Collapse/Expand** — This MetaConnector collapses records or expands a result set into a single Domino form.
- ✍ **Order** — This MetaConnector sorts data returned through an LEI connection document.
- ✍ **Meter** — This MetaConnector provides a way to collect statistical usage data.
- ✍ **Trace** — This MetaConnector allows the capture of trace data

[NOTE: The Connection Broker MetaConnector previously available with LEI R4.6 and R5 has been removed from LEI 6. This functionality has been replaced with the new Integrated Credentials support provided with LEI 6. MetaConnectors are discussed at length in a recently updated white paper, entitled “Enterprise Integration with Lotus Domino for iSeries.” You can find this white paper by going to the “Hotlinks” section of this course.]

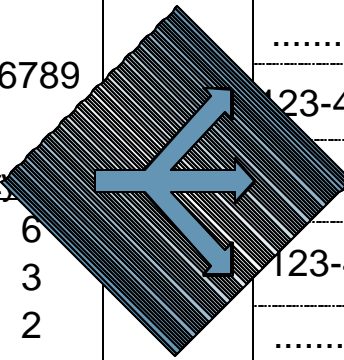
Collapse/Expand MetaConnector

Domino
Form

John Doe	
SS#123-45-6789	
<u>Item</u>	<u>Qty</u>
Widget	6
Gadget	3
Thing	2

RDBMS
Table

.....
123-45-6789 Widget 6
123-45-6789 Gadget 3
123-45-6789 Thing 2
.....



Collapse / Expand MetaConnector

Here is an example of how the Collapse / Expand MetaConnector works. In essence, it provides the ability to collapse multiple rows of data, each of which have a common key value, into a single Domino form that contains multi-valued fields. Conversely, this MetaConnector can expand a single Domino form into multiple rows of a relational database table.

[NOTE: There is an excellent Lotus Web page that explains the Collapse / Expand MetaConnectors (also referred to as MetaLinks) in great detail listed in the "Hotlinks" section of this course.]

LEI 3.1

- Significant quality focus
- Web access to administration
- Additional connectors
- Updated documentation
- Platforms
 - ▶ Win NT, Windows 2000, Solaris, AIX, iSeries, OS/390
- LEI 3.2 not available on iSeries
-

LEI 3.1

The current release of LEI for the iSeries platform is LEI 3.1.x. This release had a significant focus on improved quality. It includes Web access to the administrator database, support for additional connectors, and updated documentation.

In addition to an iSeries server, LEI 3.1.x is also available for Windows NT, Windows 2000, Solaris, AIX®, and OS/390®. LEI 3.2, though out for some platforms, is not yet supported on iSeries servers.

LEI 6 is available as a beta download at the Lotus Web site listed in the “Hotlinks” section of this course.

Domino Enterprise Connection Services (DECS)

- Seamless Integration with Domino
 - "Live" data access to Connector source data — data stored in enterprise system
- **High Performance**
 - Persistent, parallel, pooled connections
- Non-programmatic, wizard-assisted interface
 - Map fields between Domino and Connector data
- ✓ Included with Release 4.63+ Domino servers
- ✓ Originally, the 'RealTime' NotesPump 2.5 Activity

Domino Enterprise Connection Services

Like LEI, Domino Enterprise Connection Services (DECS) is another non-programmatic tool used to provide realtime access to enterprise data. Users can open, create, update, or delete documents whose data will be retrieved and updated in realtime as if the data were stored in Domino. A wizard will step you through the creation of Connection and Activity documents so that fields in the backend data source are mapped to fields in a form in a Domino database.

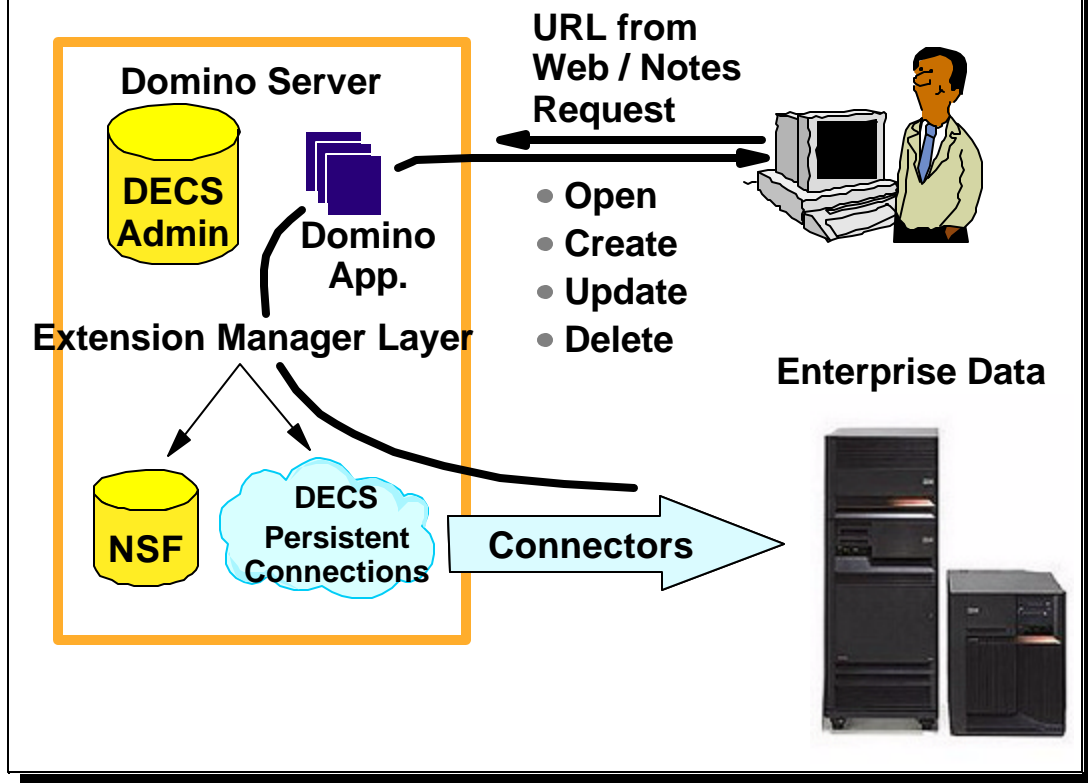
When DECS starts, it will open many connections to the data source. These connections are pooled, persistent, and parallel. When a user needs backend data, the system first checks this "pool" of DECS connections for an open connection. This means that the user does not have to wait for a connection to be made, so effectively, user performance is improved.

The fact that these DECS connections are persistent allows a user to be logged into the backend system for the duration of the Domino server session. This eliminates the need for the user to log in and out with every query.

Additionally, because the connections are parallel, many users can access, query, and update the backend system at the same time.

[NOTE: DECS is included with Domino Release 4.6.3 and above. Previously, it was the "RealTime" NotesPump 2.5 Activity.]

How DECS Works



How DECS Works

DECS uses similar forms-based Activities and connections to accomplish its task of establishing persistent, parallel, pooled connections. To create a DECS activity, you must first create a Connection document. The Connection document defines the type of data source, location of the data source, and the user ID and password used to access the data. You must then create an Activity document. The Activity document defines: which Connection document to use, the field mapping between Domino and the external data source, and which events to monitor. Once the Activity is started, DECS monitors the Domino database and the Connection form for the events specified in the Activity. Once an event occurs, DECS will use persistent connections to retrieve or update the backend data source based on the key value stored in the Domino document in which the event occurred.

DECS allows multiple data sources to be accessed from the same form, but you need to create a separate Activity for each data source.

Connection to DB2 UDB for iSeries

The screenshot shows a Lotus Notes application window titled "DB2 SAMPLE (using 'DB2ADMIN') - DB2ADMIN EMPLOYEE - Lotus Notes". The window has a menu bar (File, Edit, View, Create, Actions, Help) and a toolbar with various icons. Below the toolbar is a navigation pane with links like "Welcome", "Mary Peterson - Inbox", "Mary Peterson - Calendar", "Crafty Hardware DE...", "DECS Administrator...", "Untitled", and "DB2 SAMPLE (using '...')". The main content area is titled "Connection to DB2" and contains two sections: "Connectivity" and "Table Selection".

Connectivity

Database:	SAMPLE
User Name:	DB2ADMIN
Password:	password Password(s) NOT Encrypted
Data Journaling:	<input checked="" type="radio"/> On <input type="radio"/> Off
Selection Type:	<input checked="" type="radio"/> Table <input type="radio"/> View

Table Selection

Owner:	DB2ADMIN
Name:	EMPLOYEE
Column(s):	BIRTHDATE (DateTime) BONUS (Numeric) COMM (Numeric) EDLEVEL (Text) EMPNO (Text) FIRSTNAME (Text) HIREDATE (DateTime) JOB (Text) LASTNAME (Text) MIDINIT (Text) PHONE (Text) SALARY (Numeric) SEX (Text) WORKDEPT (Text)

Comment:

Connections to DB2 UDB for iSeries

This is a snapshot of what a Connector to DB2 UDB for iSeries would look like. The database would come from the WRKRDBDIRE table and would be either the *local entry or would contain the entry to link to another system. You also must provide a user ID and password to access the system and the DB2 UDB for iSeries table. Once you fill in the table information, the columns that are available for use will be pulled into the connection.

Map Fields

DECS Administrator

Key and Data Field Mapping

In this step, configure the mapping of data between the connection and the Notes form. You should be familiar with the fields in the Notes form and in the connection before proceeding.

Select the key field(s) for both Domino and the connection in the "Keys" section. Then select the fields to be mapped in the "Fields" section. Click OK when finished.

Source

☐ Use UNID as key

Select Keys

CCity (Text)
CDCT (Float)
CFirst (Text)
☒ CID (Float)

1 Key Fields Selected

Target

CHGCCOD (Numeric)
CITY (Text)
☒ CUSNUM (Numeric)
INIT (Text)

1 Key Fields Selected

Select Fields

☒ CCity (Text)
☒ CDCT (Float)
☒ CFirst (Text)
☒ CLAST (Text)
CLDate (Float)

4 Fields Selected

Select Fields

BALDUE (Numeric)
☒ CDTDUE (Numeric)
CDTLMT (Numeric)
CHGCCOD (Numeric)
☒ CITY (Text)

4 Fields Selected

Keys and Fields Selected

CID (Float)

CUSNUM (Numeric)

CCity (Text)
CFirst (Text)
CLAST (Text)
CDCT (Float)

CITY (Text)
INIT (Text)
LSTNAM (Text)
CDTDUE (Numeric)

Map Fields

When you create an Activity, you select the connector you want to use and the Domino database you want the data to be fed into. Once that is done, you then must map the fields from the external table to the fields on the form in the Domino database. This is a snapshot of what that looks like. You must define one of the fields as a key field so that DECS knows what row of data to go after in the DB2 UDB table.

DECS "Advanced" Options

- "Initialize Keys" Agent
- Multi-value Data Option
- Persistent Connections Management
- Conflict Detection Option
- Store Retrieved Data to Domino
- Filter & Event Formulas
 - ▶ (Tip: compose as an agent first)

DECS Advanced "Options"

The "Initialize Keys" agent will go out to the external data source and bring all of the key fields into Domino. A Domino document is created for each key value. If this agent is run more than once, duplicate documents could be created.

The Activity document has options for multi-value data, conflict detection, and filter formulas. Filter formulas are used to evaluate conditions in Domino applications, such as the status of workflow events, to control enterprise data queries and updates. DECS also manages the persistent, parallel, pooled connections it has already established from Domino to external data sources, thereby enabling efficient, simultaneous data access.

What is Multi-value Data ?

Domino Document

Name: John Doe
SS# 123-45-6789

Item	Qty
Widget	6
Gadget	3
Thing	2

RDBMS Table

.....		
123-45-6789	Widget	6
123-45-6789	Gadget	3
123-45-6789	Thing	2
.....		

What is Multi-value Data?

The multi-value data option works the same as it did in LEI. It allows you to redistribute data in ways that accommodate the nuances of data presentation and storage — as is often found between a more visually-based Domino document and a relational database.

Applications with Multi-value Data

The screenshot shows a software interface with three main windows:

- Mapping Window:** Displays a list of fields on the left and a list of fields on the right. The 'Maker (Text)' field is highlighted with a red circle. A red arrow points from this field to the 'Make' window.
- Make Window:** Displays a table of data for 'Aeronica'. The table has columns: Name, Horsepower (hp), Empty Weight (lbs), Gross Weight (lbs), and Fuel Capacity (gal). The data is as follows:

Name	Horsepower (hp)	Empty Weight (lbs)	Gross Weight (lbs)	Fuel Capacity (gal)
Aeronica 11 AC Chief 11 AC Chief	65	786	1250	15
Aeronica 11 CC Super Chief 11 CC Super Chief	85	820	1350	15
Aeronica 15 Ac Sedan 15 Ac Sedan	145	1180	2050	36
Aeronica 7 AC Champ 7 AC Champ	65	740	1220	14
Aeronica 7 CCM Champ 7 CCM Champ	90	810	1300	19
Aeronica 7 DC Champ 7 DC Champ	85	800	1300	19
- Options Window:** Displays various options for the application. The 'Multi-value data' section is highlighted with a red box, and the 'Use multi-value data fields' checkbox is checked. The 'Sorting' section is also highlighted with a red box, and the 'Sort multi-value data' checkbox is checked. The 'Text order' section is highlighted with a red box, and the 'Case insensitivity' radio button is selected.

Applications with Multi-value Data

Here is a diagram of how you would define a multi-value data activity to pull in the data that would be needed for a particular Activity. As you can see, you can easily sort multi-value data, too, making logical or intuitive presentation an easier thing to accomplish.

Scheduling Data Availability

RealTime Activity Author: Glen Salmon/CAM/Lotus
Current Status: Not Running

Identification
Name:

Notes Application 1 **Lotus Connection** NEW 2
Database: Airplanes
Data Source: DB2 Venturi (using "dbinst1") - WSA.AIRPLANESTATS
Name: WSA\airplane.nsf
Form: Airplane
Table: WSA.AIRPLANESTATS

Mapping 3
Key(s): Model (Text) Key(s): MODEL (Text)
Field(s): Ceiling (Float) Field(s): CEILING (Int)
 Climb (Float) CLIMB (Int)
 CruiseSpeed (Float) CRUISESPEED (Int)
 Description (Text) DESCRIPTION (Text)
 EmptyWeight (Float) EMPTYWEIGHT (Int)
 Fuel (Float) FUEL (Int)
 GrossWeight (Float) GROSSWEIGHT (Int)
 Horsepower (Float) HORSEPOWER (Int)
 Keywords (Binary) KEYWORDS (Text)
 Landing50 (Float) LANDING50 (Int)
 LandingRoll (Float) LANDINGROLL (Int)
 Maker (Text) MAKER (Text)
 Range (Float) RANGE (Int)
 StallSpeed (Float) STALLSPEED (Int)
 Takeoff50 (Float) TAKEOFF50 (Int)
 TakeoffRoll (Float) TAKEOFFROLL (Int)
 TopSpeed (Float) TOPSPEED (Int)

Events 4
Document Events to monitor:

► **Options ...**

Scheduling 5
Scheduling Option: ☒ Auto Start ☐ Custom
Run Time: 08:00 AM - 08:00 PM
Run on Days: ☐ Sun ☒ Mon ☒ Tue ☒ Wed ☒ Thur ☒ Fri ☐ Sat

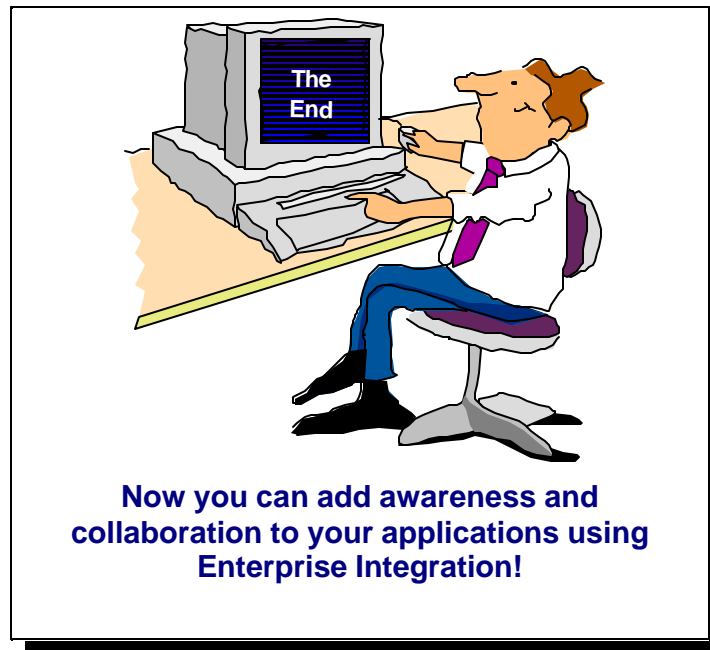


Scheduling Data Availability

You can also schedule a DECS activity to start or run at certain times of the day or particular days of the week.

Mini-quiz

1. LEI ...
 - ☐ Provides for visual mapping of fields that exist in Domino applications to fields that exist in backend data sources.
 - ☐ Allows for the high-volume transfer and synchronization of data.
 - ☐ Is designed to support the multithreaded and multitasking needs.
 - ☐ All of the above
2. There are two non-programmatic tools that use the Domino Connectors.
 - ☐ True — Correct. Yes, these two tools are LEI and DECS.
 - ☐ False
3. What are metaconnectors?
 - ☐ It takes complex tasks and makes them easier through an intuitive, task-oriented user interface.
 - ☐ It uses forms to manage the transfer of data.
 - ☐ A Domino technology that encapsulates the most common transformations that occur (in conjunction with Activities) and encapsulates them into Forms-based components.
 - ☐ All of the above



Conclusion

Congratulations! You have just become more “enlightened” on the powerful options Domino provides to assist you in your integration efforts — with your back-office applications and with your Web presence. Domino can easily and elegantly be the environment-of-choice for your entire integration development platform.

You should be more comfortable with Lotus’ strategy for continued integration support. You should better understand, after taking this course, the range of Domino-based data and business logic Connectors, as well as the native-Domino tools that use them.

Do not forget that there is a closely-related course, Enterprise Integration with Domino for iSeries: Java, XML, and Other Tools, that talks about the Java and XML technologies, as well as miscellaneous other access methods, that can also be used for your integration tasks. (A link to this course can be found in the Links section.)

Good luck as you begin to develop integrated Domino e-business applications into your iSeries applications!

Final Test

1. The biggest value of Domino...
 - ☐ Is to integrate back-office, collaborative, and Web applications.
 - ☐ Is to provide collaboration technologies.
 - ☐ Is to deliver email reliably as an enterprise scales in size and email volume.
 - ☐ None of the above
2. Domino quickly builds a Domino front end to ERP, CRM, and SCM applications for access over the Web.
 - ☐ True — Correct.
 - ☐ False
3. A variety of enterprise integration tools have become available for Domino on iSeries...
 - ☐ @functions & Java
 - ☐ LC LSX & LS:DO
 - ☐ DECS & LEI
 - ☐ All of the above
4. There are two types of connectors...
 - ☐ DECS and vendor-supplied APIs
 - ☐ ERP and collaborative
 - ☐ Data logic and business logic
 - ☐ None of the above
5. Connectors handle the login authentication, connection pooling, and data translations across the different target data sources.
 - ☐ True — Correct.
 - ☐ False
6. There are several IBM ERP Business Partners that have built their own Domino connectors. Some of these software providers are:
 - ☐ SAP
 - ☐ J.D. Edwards
 - ☐ Lawson
 - ☐ All of the above
7. LEI ...
 - ☐ Provides for visual mapping of fields that exist in Domino applications to fields that exist in backend data sources.
 - ☐ Allows for the high-volume transfer and synchronization of data.
 - ☐ Is designed to support the multithreaded and multitasking needs.
 - ☐ All of the above
8. There are two non-programmatic tools that use the Domino Connectors.
 - ☐ True — Correct. Yes, these two tools are LEI and DECS.

☐ False

9. What are metaconnectors?

- ☐ It takes complex tasks and makes them easier through an intuitive, task-oriented user interface.
- ☐ It uses forms to manage the transfer of data.
- ☐ A Domino technology that encapsulates the most common transformations that occur (in conjunction with Activities) and encapsulates them into Forms-based components.
- ☐ All of the above

10. DECS ...

- ☐ Has a wizard that will step you through the creation of Connection and Activity documents so that fields in the backend data source are mapped to fields in a form in a Domino database..
- ☐ Lets users open, create, update, or delete documents whose data will be retrieved and updated in realtime as if the data were stored in Domino.
- ☐ Will open many connections to the datasource. These connections are pooled, persistent, and parallel.
- ☐ All of the above

11. Because DECS connections are parallel; many users can access, query, and update the backend system at the same time.

- ☐ True — Correct. Additionally, because the connections are also persistent, users can be logged into the backend system for the duration of the Domino server session. This eliminates the need for the user to log in and out with every query.
- ☐ False

12. Why are filter formulas used with DECS Activity documents?

- ☐ To evaluate conditions in Domino applications, such as the status of workflow events, to control enterprise data queries and updates.
- ☐ To manage the transfer of data between the backend system and the Domino NSF.
- ☐ To go out to the external data source and bring all of the key fields into Domino.
- ☐ All of the above

13. When DECS starts, it will open many connections to the datasource.

- ☐ True — Correct. These connections are pooled, persistent, and parallel.
- ☐ False

14. The fact that DECS maintains many open connections to the datasource provides what advantage(s)?

- ☐ The user does not have to wait for a connection to be made.
- ☐ User performance is improved.
- ☐ All of the above
- ☐ None of the above

15. To create a DECS activity, you must first create a Connection document. The Connection document defines...
- ☐ The type of data source
 - ☐ The location of the data source
 - ☐ The user ID and password used to access the data
 - ☐ All of the above
16. To create a DECS activity, you must also create an Activity document, which defines...
- ☐ Which Connection document to use
 - ☐ The field mapping between Domino and the external data source
 - ☐ Which events to monitor
 - ☐ All of the above
17. DECS will use persistent connections to retrieve or update the backend data source based on the key value stored in the Domino document in which the event occurred.
- ☐ True — Correct.
 - ☐ False
18. DECS does not allow multiple data sources to be accessed from the same form.
- ☐ True
 - ☐ False — Correct. However, you must create a separate Activity for each data source.

Hotlinks Related to this Internet-based course

These Hotlinks are referenced from the speaker notes of the course pages. They provide useful Web sites and reference materials to supplement the information in this course.

- ✍ From the **Case Study: Corning Data** page: You can see a demo of how Domino integrates J.D. Edwards World applications with intuitive Web interfaces. Simply visit the Web site shown below. FYI, you will need a user ID (which is demouser) and a password (which is "password"):
<http://portal.corningdata.com/>
- ✍ From the **Domino Connectors — ERP Vendors** page: A beta of the SAP R/3 connector product is available as a download from the Web site listed here:
www.lotus.com/idd/beta/sap17beta.nsf
- ✍ From the **Lotus Enterprise Integrator** and **Metaconnectors** page: You can find a recently updated white paper, entitled "Enterprise Integration with Lotus Domino for iSeries" by visiting the following Web site:
ibm.com/servers/enable/site/education/ibo/record.html?entwp
- ✍ From the **Collapse / Expand MetaConnectors** page: You can find an excellent, detailed discussion on the Collapse / Expand MetaLink at the following site:
www.lotus.com/products/eibu_knowbase.nsf/eipages/1B0DFA8ED57590E88525673E00544791
- ✍ From the **Lotus Software eXtensions (LSXs)** page: For more information about LSXs (and to download the LSX Toolkit), visit the Lotus Developer Network at:
www.lotus.com/home.nsf/welcome/developernetwork
- ✍ From the Lotus Connector LotusScript Classes page: To download the LC LSX classes), visit the Lotus Developer Network at:
www.lotus.com/home.nsf/welcome/developernetwork
- ✍ From the **Specialized LSX** page: For more information about LSXs (and to download the LSX Toolkit), visit the Lotus Developer Network at:
www.lotus.com/home.nsf/welcome/developernetwork
- ✍ From the **Specialized LSX** page: A beta of the SAP R/3 connector product is available as a download from the Web site listed here:
www.lotus.com/idd/beta/sap17beta.nsf
- ✍ From the **@DBFunctions** page: You can find a recently updated white paper, entitled "Enterprise Integration with Lotus Domino for iSeries," which discusses SQL functionality, by visiting the following Web site:
ibm.com/servers/enable/site/education/ibo/record.html?entwp

✍ From the **LEI 3.1** page: LEI 6 is available as a beta download from:
www.lotus.com/idd/beta/lei6iseriesbeta.nsf

Other References and Additional Information

Useful Web sites:

- ✍ The Lotus Developer Domain site
www.lotus.com/idd
- ✍ The Lotus Enterprise Integration site
www.lotus.com/ei
- ✍ Lotus Domino for iSeries home page
ibm.com/eserver/iseries/domino and
ibm.com/eserver/iseries/developer/domino
- ✍ PartnerWorld for Developers Domino for iSeries home page
ibm.com/eserver/iseries/developer/domino
- ✍ Enterprise Integrator Documentation
www.lotus.com/products/eibu_knowbase.nsf/eipages/0BEA4D1F42CC79E68525675B00692F73
- ✍ Introduction to the Domino Objects
<http://www.lotus.com/learningcenters/javatlc.nsf/d4c31a224fe594838525676d005508b6/ec13d53051d4e5aa8525676d005433bf?OpenDocument>
- ✍ Java/WebSphere Application Server performance tips
ibm.com/eserver/iseries/service/itc/pdf/top10wasperformancetips.pdf

Online Seminar

- ✍ Domino Enterprise Connection Services
media.lotus.com/appdev/decs/decs1.htm

Redbooks

IBM Redbooks Lotus Collection Online Web site located at:
ibm.com/redbooks/cdroms/sk2t8039.html and type in the “SG” number, or title, into the Search engine area.

- ✍ Lotus Domino R5 Enterprise Integration: Architecture and Products (SG24-5593)
- ✍ Connecting Domino to the Enterprise Using Java (SG24-5425)
- ✍ Lotus Notes and the MQSeries Enterprise Integrator (SG24-4217)
- ✍ Lotus Domino for AS/400: Integration with Enterprise Applications (SG24-5345)
- ✍ Using DB2 in a Domino Environment (SG24-4918)

Education

- ✍ Go to the Lotus Education Home page at:
www.lotus.com/home.nsf/welcome/education

Documentation

- ✍ This site offers a wealth of online manuals: user and reference guides, installation and quickstart guides, administrator's guides, release notes, best practices guides, help notes, developer guides, etc.
www.lotus.com/idd/notesua.nsf/0b345eb9d127270b8525665d006bc355/4e1be4e60ecea359852569810056d267?OpenDocument

Frequently Asked Questions

- FAQs related to LEI are found at the following Web site:
www.lotus.com/products/eibu_knowbase.nsf/eipages/lei30faq
- FAQs related to the LEI character set translation are found at the following Web site:
www.lotus.com/products/eibu_knowbase.nsf/eipages/92CF4ABA204E538F8525673E0054475D
- ✍ FAQs from an EI Enablement class:
www.lotus.com/products/eibu_knowbase.nsf/eipages/73BD58D9D5FCC8978525682D005A889E
- FAQs about the IBM Toolbox for Java:
ibm.com/eserver/series/toolbox/faqjdbc.htm and
ibm.com/eserver/series/toolbox/faq.htm
- Notes C API FAQs
www.lotus.com/developers/devbase.nsf/Data/Document1552

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