

ANGEL[®] 7.3 XEI Administrators Reference



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Table of Contents

Conventions Used in This Manual	5
Typographic Convention.....	5
Abbreviation Convention.....	5
Document Icons.....	5
Introduction	6
Overview.....	6
Implementing XEI.....	6
XEI Architecture	6
System Requirements.....	7
Components.....	7
ANGEL / XEI environment.....	9
XEI User Interface	11
XEI Agents Manager.....	11
<i>XEI Agent Context Menu</i>	12
<i>Agent History</i>	13
XEI Configuration	14
Method 1: ODBC Agents.....	14
<i>Security Considerations</i>	14
Step 1: Initial Setup.....	14
Step 2: Configure ODBC Data Agent.....	16
Step 3: Scheduling and Notification.....	17
Step 4: Configure Data Mapping.....	18
Step 5: Map Data.....	18
Step 6: Actions.....	21
Method 2: File Systems Agents.....	25
<i>Security Considerations</i>	25
<i>Agent Setup</i>	25
Step 1: Initial Setup.....	25
Step 2: Configure File System Agent.....	27
Step 3: Scheduling and Notification.....	28
Step 4: Configure Data Mapping.....	28
Step 5: Map Data.....	29
Step 6: Actions.....	32
Method 3: Messaging Agents.....	36
<i>Security Considerations</i>	36

Message Authentication.....	36
Message Encryption	36
Agent Setup.....	36
Step 1: Initial Setup.....	36
Step 2: Configure Message Broker Agent	38
Step 3: Scheduling and Notification.....	39
Step 4: Configure Data Mapping.....	39
Step 5: Map Data	40
Step 6: Actions	43
Method 4: Hybrid-Hosted Integrations.....	47
Appendix A: Upgrading from 7.2	48
Overview.....	48
Recommendations.....	48
Appendix B: XEI Data Mapping Subject Areas.....	49
Accounts	49
Courses.....	51
Course Roster.....	55
Person.....	57
Appendix C: XEI Database Tables	61
Appendix D: Troubleshooting Guide.....	62
Frequently Asked Questions.....	62
Validation Error Messages.....	62
Step 2: Configure ODBC Agent, Number 6.....	62
Step 2: Configure File System Agent, Number 6.....	63
Step 2: Configure Message Broker Agent, Number 6.....	63
Appendix E: Advanced Configuration.....	64
XEI Environment Variables.....	64
Appendix F: Connection Strings.....	66

Conventions Used in This Manual

Typographic Convention

Type Style	Represents
Example Text	Words or characters that appear on the screen. These include field names, screen titles, and pushbuttons.

Abbreviation Convention

Abbreviation	Represents
R	Required field
O	Optional field
C	Conditionally required field

Document Icons

Icon	Icon Meaning
	Tip – a tip is a type of note that helps the users apply the techniques and procedures described in the test to their specific needs. A tip suggests an alternative method that may not be obvious and helps users understand the benefits and capabilities of the item.
	Note – Notes call the user's attention to information of special importance.
	Reference – Refers the user to another source of information.
	Caution – Caution advises users of actions that could potentially cause problems.

Introduction

Overview

ANGEL's Extended Enterprise Integration (XEI) agent framework automates the interchange of data from your Student Information System (SIS) database to ANGEL. By eliminating manual steps, XEI reduces integration costs and improves reliability and accuracy. It reduces operating costs by enabling integration to ANGEL from more than one source database, automatically keeping your databases in synch, and tracking error messages for easier debugging. Furthermore, XEI reduces maintenance costs and disruption as ANGEL and your other databases change.

With XEI, course and user data used in ANGEL, including account data and course enrollment drops and adds, is automatically exchanged with the SIS database (i.e., student information system, Datatel, SCT Banner, Peoplesoft, or other ERP system).

Institutions set up ANGEL XEI to run on the schedule they choose, e.g. hourly, daily, weekly, real-time etc. XEI “pulls” the information from the source database and alters the ANGEL database appropriately.

Implementing XEI

Implementing XEI will require a small project team in order to ensure all agents are created accurately. It is important to note that this project team may need to reconvene if an upgrade to ANGEL or the SIS will impact configured agents.

The typical roles/skills required to complete the configuration include:

SIS Data Base Administrator

- Knowledgeable in the SIS database structure
- Provide a database account with sufficient privileges to communicate with XEI
- Recommend an ODBC connection string to the SIS database
- Assist in troubleshooting SIS related issues
- Provide information concerning Remote Messaging services (if applicable)

SQL Server Data Base Administrator

- Knowledgeable in MS SQL Server
- Provide a database account with sufficient privileges to communicate with XEI
- Recommend an ODBC connection string to the AngelSQL database
- Assist in troubleshooting SQL Server related issues

ANGEL Administrator

- Knowledgeable in ANGEL application

XEI Architecture

ANGEL XEI is an XML web service that runs on the ANGEL server. It processes data using the IMS Enterprise Specification, published by the IMS Global Learning Consortium (<http://www.imsglobal.org/background.html>). The IMS Enterprise

Specification is an open specification for interoperable learning technology developed by a consortium of institutions and product providers to enable information sharing among different enterprise applications.

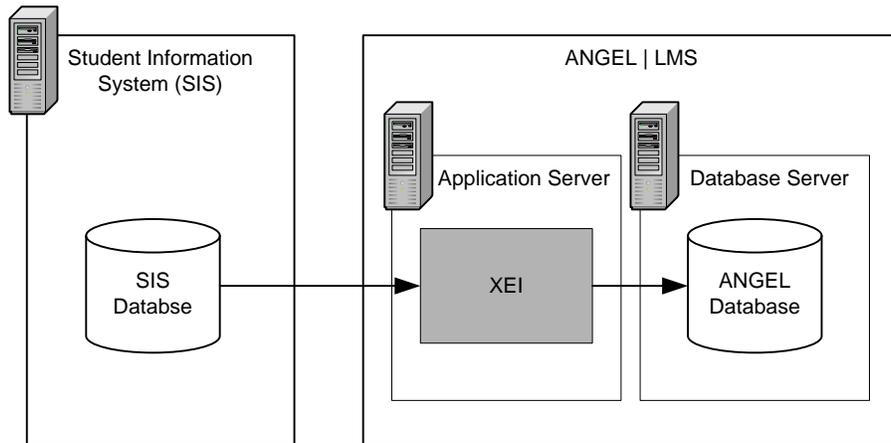


Figure 1. ANGEL XEI Diagram

The XEI process can also be fully automated to execute on specified intervals. Each unique XEI mapping created in ANGEL is defined as an XEI Agent. When executed, the XEI Agent performs the specified tasks as outlined in the agent.

System Requirements

The ANGEL XEI system configuration requirements are the same as the ANGEL|LMS system. Since this system is a prerequisite to installing XEI, the following are offered as a summary. Refer to the ANGEL Technical Recommendations available at <http://support.angellearning.com> for complete details:

- ANGEL | LMS and ANGEL XEI license key.
- Microsoft .NET framework installed on the ANGEL server and database server for a multiple server environment or load balanced environment.
- ANGEL database SQL Server 2005.

Components

XEI utilizes components within the standard ANGEL environment to complete its tasks. The key components used within XEI include:

Component	Description
ANGEL Agents Manager	The ANGEL Agents Manger is a service that allows you to automate the XEI administrative tasks. XEI communicates directly with the ANGEL Agents Manager to establish jobs which schedule the XEI task. Each unique XEI mapping created in ANGEL is defined as an agent task. When executed, the agent task initiates the XEI program which performs the Pre-Process, XEI Transformation, and Post-Process steps.

Component	Description
AngelSQL Database	<p>The AngelSQL database contains the ANGEL application tables. There are three ANGEL subject areas which can be updated by XEI, these include:</p> <ul style="list-style-type: none"> • Students - ACCOUNTS and PEOPLE table • Courses – COURSES table • Membership - COURSE_ROSTER table <p>Also included in the AngelSQL database are the XEI Database tables which store agent-related data.</p>
Environment Variables	<p>XEI-specific environment variables must be configured:</p> <ul style="list-style-type: none"> • XEI_BASE_PATH • XEI_FORCE_PREVIEW_MODE • XEI_DEFAULT_LOG_MODE • XEI_MINIMUM_LOG_MODE • XEI_SHOW_ALL_TRANSACTION_MESSAGES
XEI File Structure	<p>During installation of XEI, a file structure is created to handle the different aspects of XEI. Each folder in the structure provides a home for the specific elements of the XEI configuration:</p> <ul style="list-style-type: none"> • Archive – Contains subfolders names by Agent Name, which archive all incoming data that is successfully processed by XEI • Config – Contains a folder per job that is titled by the ID of the job. Each folder contains a file called Integration Settings.xml. This file contains all settings for the job. These settings are also stored in the database. • DataFileDrop – Default location for File System Agents to place data files for processing. • Log – Keeps log files in folders based on Agent's ID. • Queue – Used internally by the message agent type to queue messages for processing. • Resources – Stores XSDs for message validation. The Defaults subfolder contains default mappings for known data source types.

The location of the XEI components depends on the configuration of the ANGEL|LMS environment. The following configuration scenarios depict the typical implementations of ANGEL and are provided to help you understand where each XEI component must reside in order for XEI to work successfully.

ANGEL / XEI environment

The recommended ANGEL server environment is comprised of an Application Server(s) and a Database Server. In this environment, the XEI components reside on the Application Server and communicate with the Database Server and Student Information System (SIS).

Based on the type of database the Student Information System uses, it may be necessary to install database specific client/driver components on the Application Server. For example, if the SIS database is Oracle, the Oracle client must be installed on the ANGEL Application Server.

The XEI Installation will create several directories on the file system where they are installed. Figure 2 shows the key components, connections and where they reside within the multiple server environments:

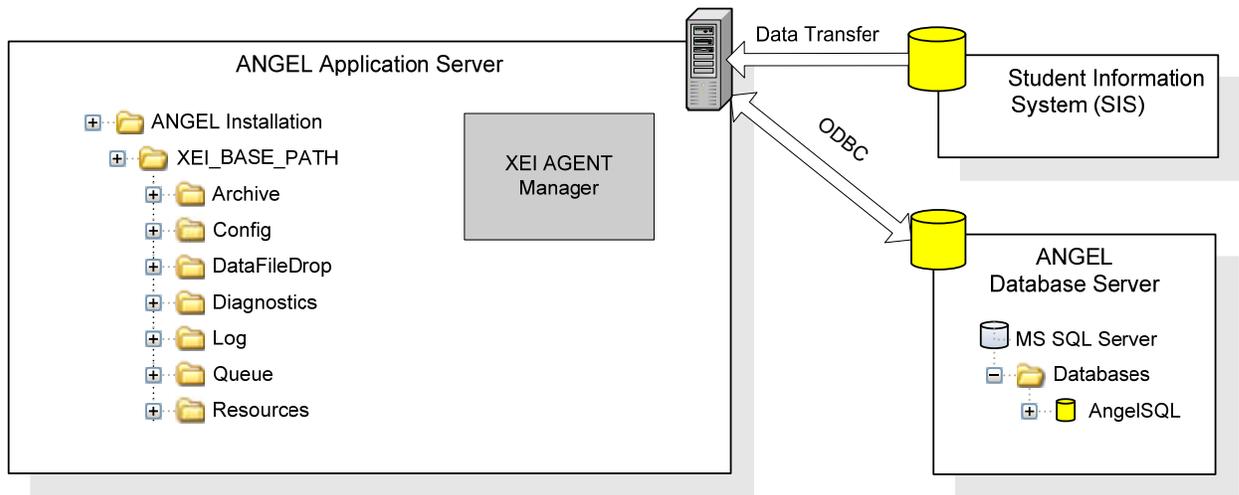


Figure 2. XEI components and database connections in an ANGEL multiple server environment

Figure 3 shows the key components, connections and where they reside within load balanced server environment:

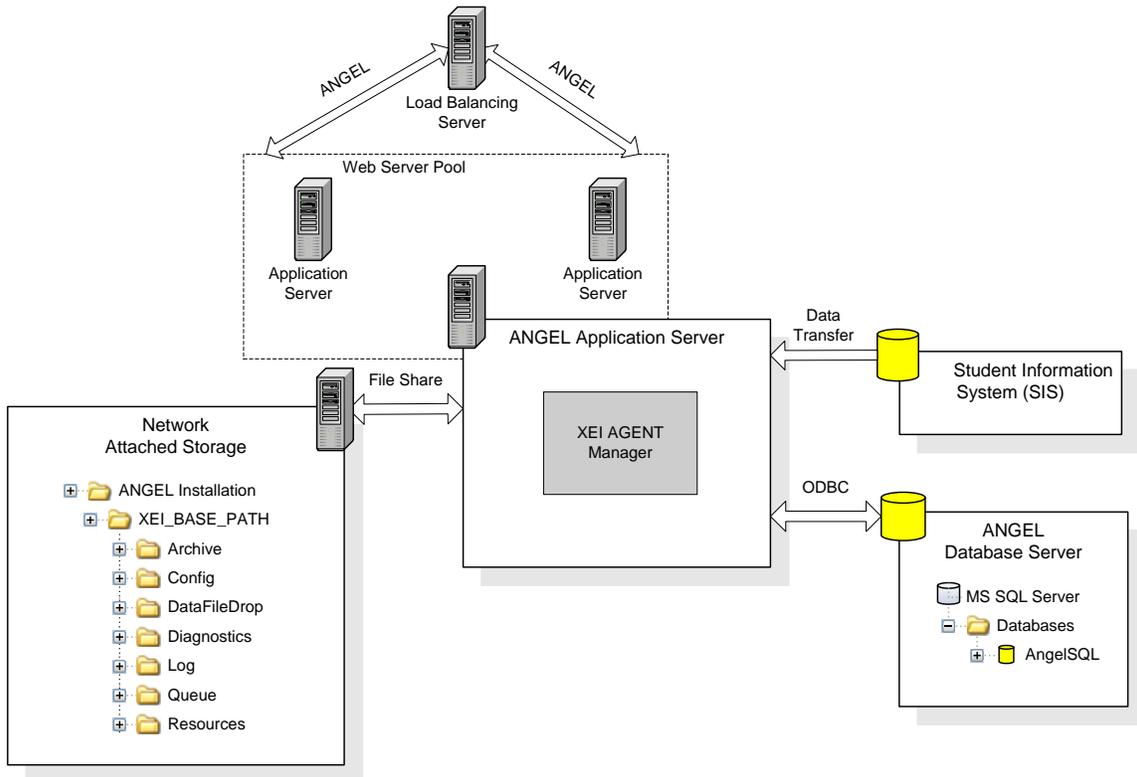
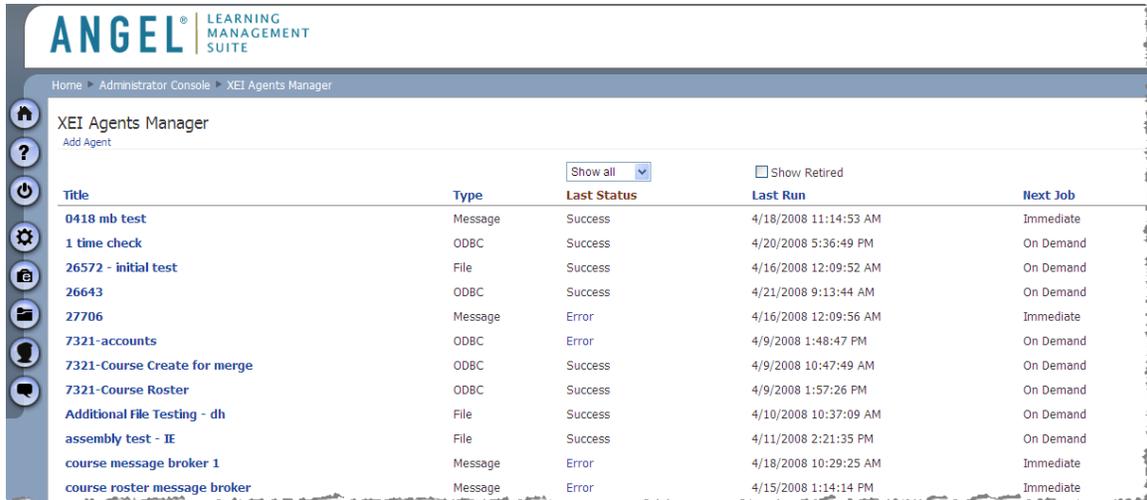


Figure 3. XEI components and database connections in an ANGEL load balanced server environment

XEI User Interface

XEI Agents Manager

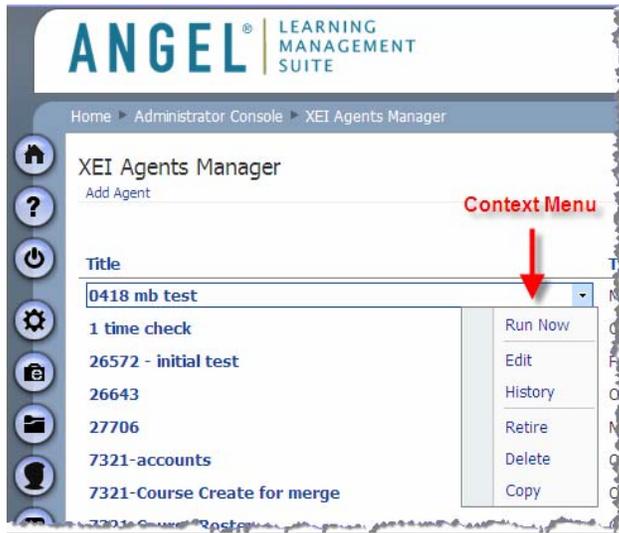
All configurations for XEI take place through the XEI Agents Manager located in the System Agents nugget of the Administrator Console. The XEI Agents Manager provides a summary of all agents that have been created in the system. By default, the page is sorted by Title; however, the list of agents can be sorted differently by clicking the heading of any column on the page.



Column	Description
Title	The title of the agent. This field will be defined by the user in the configuration process.
Type	The source type of the agent. <ul style="list-style-type: none"> • ODBC • File • Message
Last Status	Status of the agent: success, processing or error
Last Run	Displays the last date and time a transaction took place with that particular agent. If the agent has never been run, it will display "Never."
Next Job	Displays the time that the next job will run for a scheduled agent that is not disabled. Possible values are: <ul style="list-style-type: none"> • Disabled • On Demand • Immediate (Message Broker or another real time agent only)

XEI Agent Context Menu

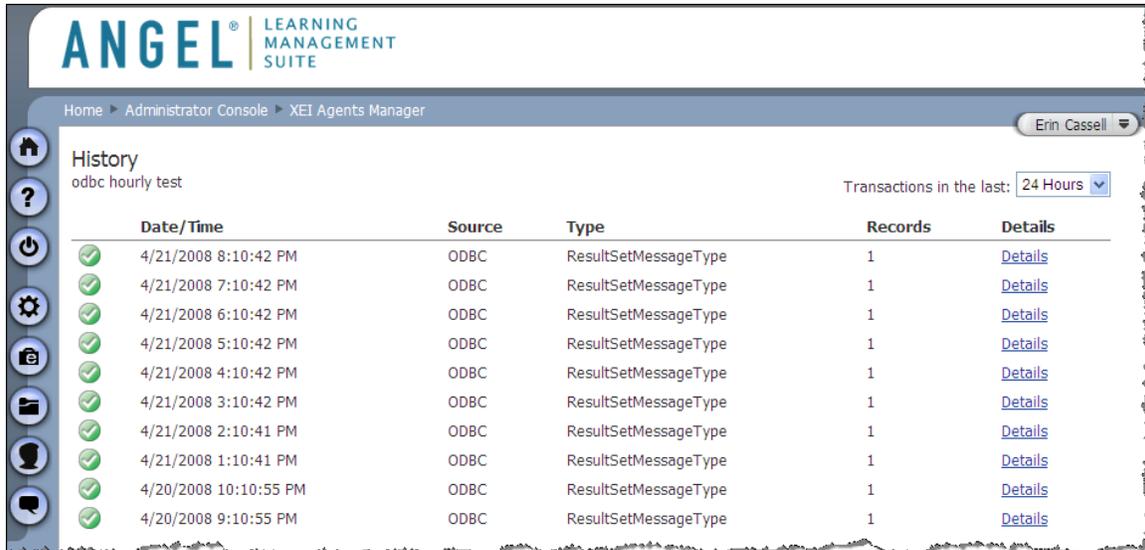
A drop-down context menu is available on each agent listed in the Agents Manager. The context menu provides further options associated with the agent.



Menu Option	Description
Run Now	When selected, the agent will run immediately.
Edit	Edits the agent. The agent is retrieved with all fields completed as they were last saved.
History	Launches the Agent History Interface which shows log data for this particular agent.
Retire/Activate	If an agent is currently enabled, this will display "Retire" If an agent is currently disabled, this will display "Activate" Launches a confirmation to either active or retire the agent.
Delete	Deletes the agent
Copy	Copies the agent

Agent History

The Agent History is available as one of the options in the context menu for the agent. Through this option, a listing of all data transactions performed by the agent in a specified amount of time. The amount of time can be changed by using the drop-down menu in the upper, right-hand corner of the screen.



Menu Option	Description
Date/Time	The date/time stamp when the transaction completed.
Source	How the message came in to the system.
Type	Type of document that was imported and signifies which processor was used to import the data.
Records	Total number of records imported or exported. In the situation of an error, the number of records imported or exported and the total number of records is displayed.
Details	Hyperlink to the details of the transaction. In the situation of an error, the error returned during processing and/or any records that created errors are displayed.

XEI Configuration

XEI provides three methods of integrations based upon the needs of the institution and the vendor of the institution's SIS database:

- ODBC
- File Systems
- Messaging

Each method of integration has unique security considerations, a specific configuration and is wizard-based in order to provide easy and accurate configuration of the agents.

Method 1: ODBC Agents

The ODBC method of integration provides a direct connection to the Student Information System database to query appropriate records and populate the ANGEL system. Connections can be made to any ODBC compliant (e.g., SQL Server, Oracle, mySQL) data source.

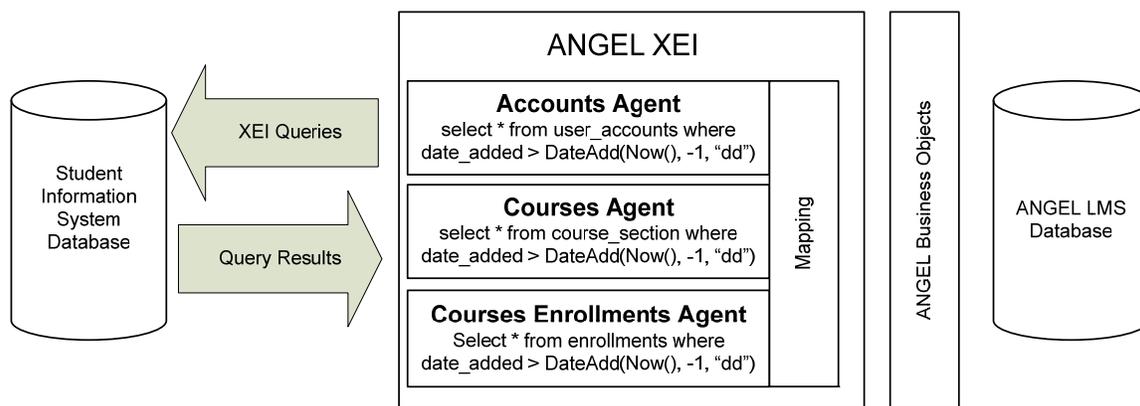


Figure 4. ODBC Method of Integration

Security Considerations

The agents framework does not support encryption when querying remote data sources, so some form of security will be required. This is specifically true for ANGEL-hosted customers but may also apply to self-hosted customers based upon the security strategy of the institution. Possible solutions are:

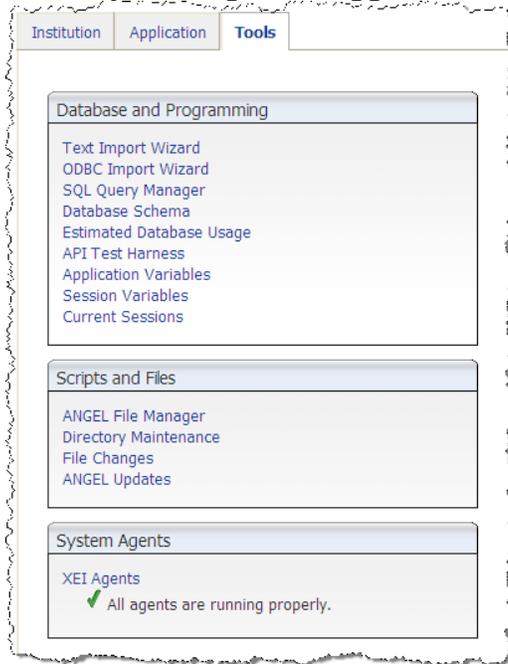
- Encryption at the provider level, such as SQL Server Native Client encryption
- Encrypting the communication channel (VPN, tunneling, etc)

In order to create an ODBC Agent, a database user must be created in the SIS database. The defined user must have "select" privileges on all tables that data will be gathered from in the SIS.

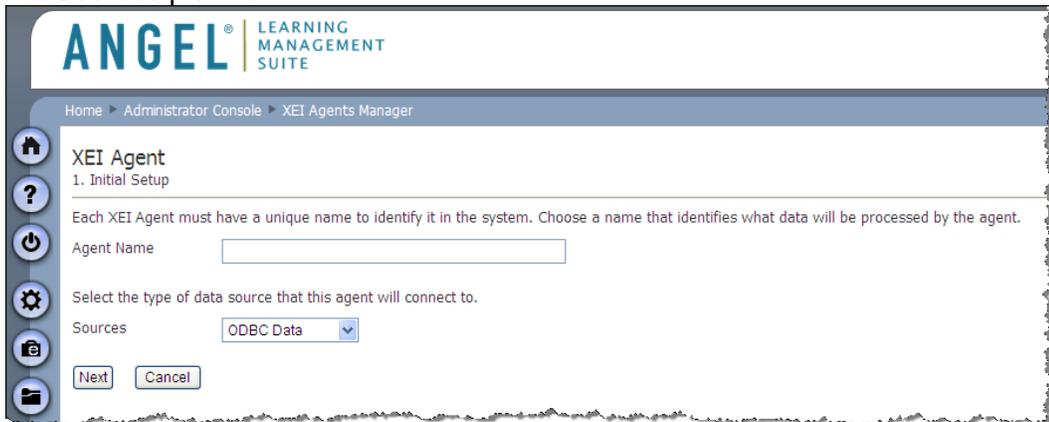
Step 1: Initial Setup

The initial setup step for XEI is consistent regardless of the method of integration. During this step, the agent will be named and method of integration will be defined.

1. Launch the XEI Agent Manager by going to **Administrators Console > Tools Tab > System Agents Nugget > XEI Agents**



2. Under the XEI Agents Manager Title select **Add Agent**
3. Populate the XEI Agent page with the **Agent Name** and select **ODBC Data** from the Sources pick-list.



Screen Option	R/O/C	Description
Agent Name	R	User-defined name of the agent.  A best practice recommendation is that type of data being transferred and the action of the agent is included in the name of agent (e.g. ADD ACCOUNTS, DROP ENROLLMENTS, etc.)
Sources	R	List of available adapters that can be used to integrate. This option is important as it will define the rest of the set-up process.

4. Select **Next**

Step 2: Configure ODBC Data Agent

This screen will define the connection string and data query that will be used to extract data from the data store.

The wizard provides a number of helpful tools on the page which include:

- Build Connection String – Tool that will help build a connection string for a variety of data sources.
- Validate (Connection String) – Checks the connection string in order to ensure a connection can be made.
- Validate (Archive Path) – Checks for the directory path and prompts to create the folder if it does not exist.
- Preview – Returns the first 25 rows to test the stated query.



The archive directory must be manually maintained; therefore, an archival strategy should be developed to remove files from the directory on a regular basis.

5. Populate the **Connection String** and **Data Retrieval Query** fields

Screen Option	R/O/C	Description
Connection String	R	Valid connection string to a source data store or a DSN for the machine.

Screen Option	R/O/C	Description
Data Retrieval Query	R	The query to be used to retrieve data from the source. The query should be formatted based on the type of data store from which it is extracting data.
Archive Physical Path	C	Specifies the directory where data will be placed after processing. This path will only be used if the checkbox above it is checked. The path defaults to [XEI Root]\Archive\[Job Name]

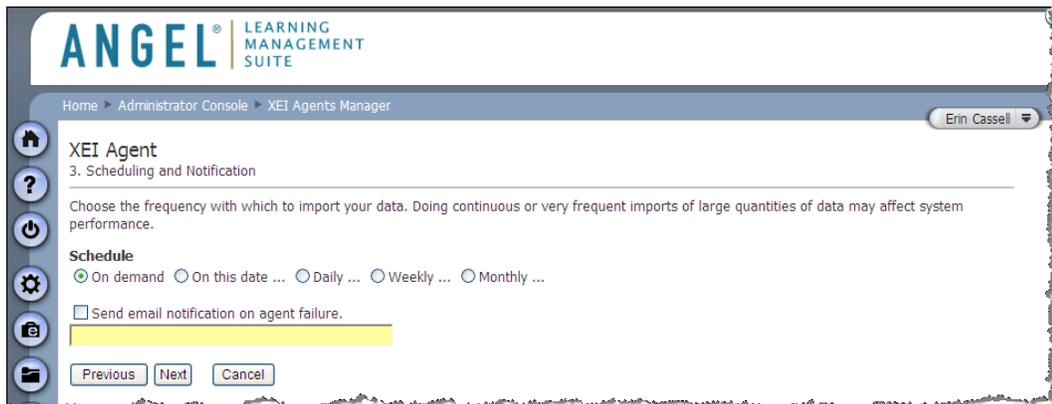
6. Select **Next**

 Upon selecting Next, the wizard automatically validates the connection string. If the connection string is valid, the system runs the query against the database. If there are any errors, the error will be displayed and you will be unable to continue. See Appendix D for a listing of validation errors and their explanations.

Step 3: Scheduling and Notification

This screen allows administration of when the data will come in to the ANGEL system. By doing this, the ANGEL administrator can balance the convenience of having up-to-date data against performance hits to the system.

7. Select the appropriate radio button for the **Schedule**. If notification on failure is required, check the **Send email notification** checkbox and populate the **Notification Email Address**.



Screen Option	R/O/C	Description
Schedule	R	Frequency with which data will be imported or exported. Note that depending on the radio button selected, additional fields may need to be populated.

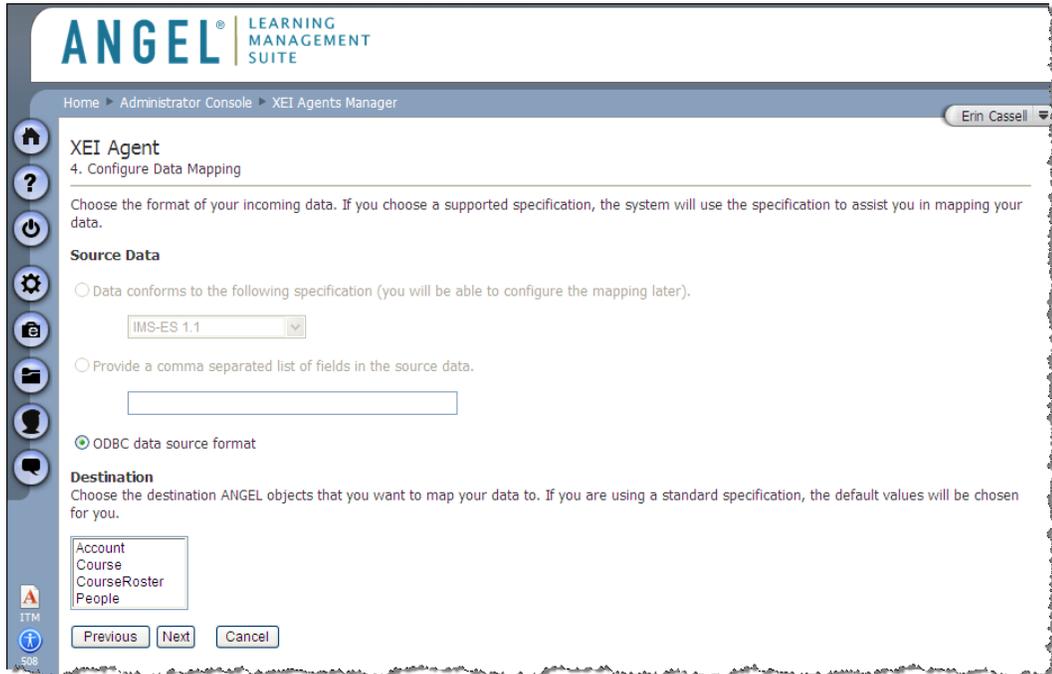
Screen Option	R/O/C	Description
Notification Email Address	C	Email address that should receive notifications upon failure of an agent. Conditionally used based on the checkbox above the email field.

8. Select **Next**

Step 4: Configure Data Mapping

This step defines the source data and destination object in ANGEL for which the data should be mapped. Because this is an ODBC agent, the only option available under Source Data is ODBC Data Source Format.

9. Select the **Destination** table for the data



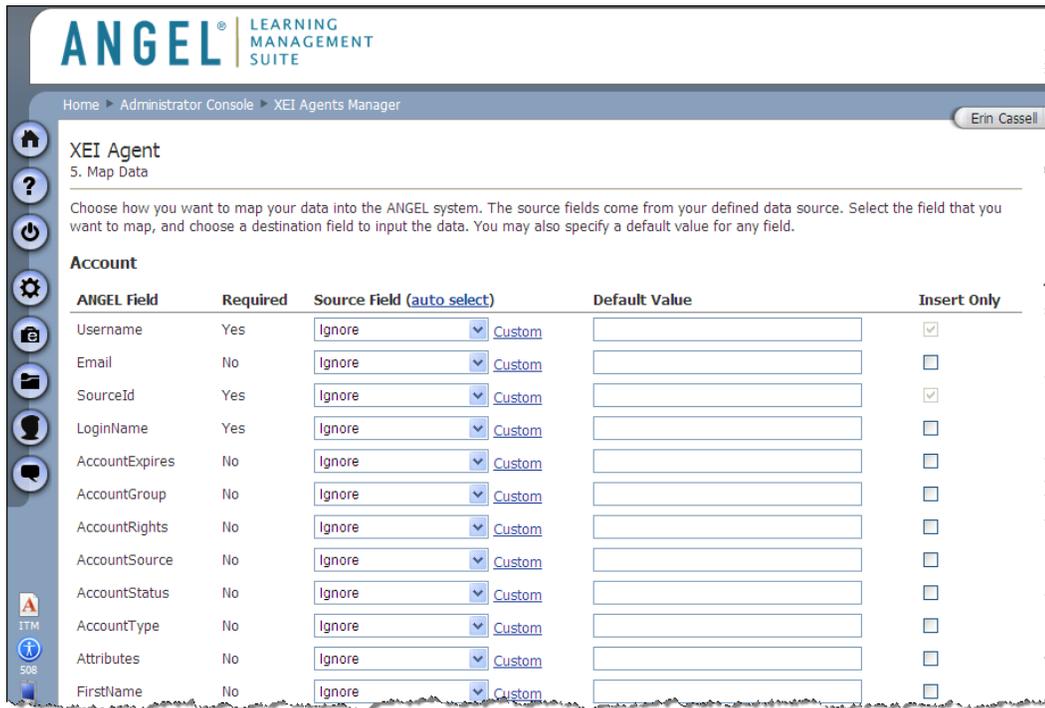
Screen Option	R/O/C	Description
Source Data	R	Defaults to ODBC data source format and cannot be changed
Destination	R	Listing of tables available to which data can be mapped.  Multiple tables can be selected from the given list for processing.

10. Select **Next**

Step 5: Map Data

This step provides the ability to map data to the fields of the ANGEL Business Object selected in the previous step.

11. Select the appropriate option from the **Source Field** drop-down, populate **Default Value** (where appropriate), and check or uncheck **Insert only** (where appropriate and/or available).

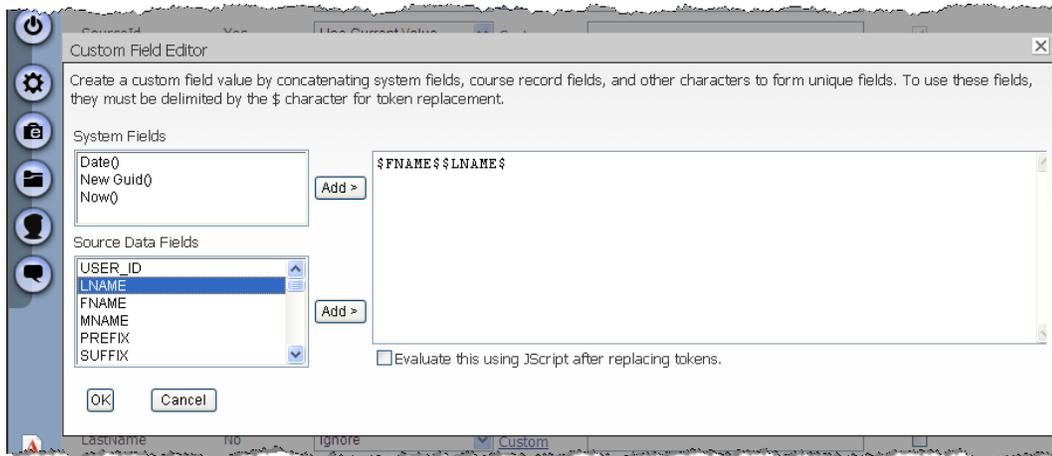


Column/Screen Option	R/O/C	Description
ANGEL Field	R	Listing of all of the fields available in the ANGEL Business Object.
Required	R	Displays whether the field is a required field in the ANGEL object.
Source Fields	R	<p>Pick-list of available fields for the source data store to which the field should be mapped. A series of defined values are also available for selection:</p> <ul style="list-style-type: none"> Ignore – Ignores the field for import Null – Set the field to null New Guid() – Automatically creates a globally unique identifier Now() - Date/Timestamp that represents the time when the record is processed Empty String – Sets the field to an empty string Use Current Value – use the value currently in the database Always use Default – Tells the agent to always use the default value even if a value is provided from the source data

Column/Screen Option	R/O/C	Description
		store  As an additional tool, the auto select option can be chosen next to Source Field to automatically select fields with identical names.
Custom	<input type="radio"/>	Allows for concatenation or formatting of the field where appropriate.
Default Value	<input type="radio"/>	If populated, creates a default value that will be used if no value is found in the source data store
Insert Only	<input type="radio"/>	If checked, the column will only be added for a new record; otherwise the column will not be affected.

Custom Field Editor

This pop-up allows for custom fields by concatenation of fields and other text to create meaningful data for the field. Custom fields can optionally be evaluated by JScript for each record.



Screen Option	Description
System Fields	Listing of tokenized values that can be inserted into a phrase of concatenated values. When added, it appears in its \$TOKEN\$ view in the right-hand pane.
Source Data Fields	Listing of the available data fields from the source data store.
Token Pane	Pane that displays the tokenized phrase that will be used on each record upon import.

12. Select Next



Upon selecting Next, the wizard automatically validates the data type of the source field with the data type of the ANGEL object field. If a type mismatch is found, a type mismatch error will be displayed with the fieldname of the mismatch.

Step 6: Actions

This step defines what processing needs to be completed on each record. The action can be controlled by a field in the record or it may just take a default action. A variety of conditional actions can be defined, which allows for different records to be treated in a specific fashion based on a record-level condition.

An example of this would be to update enrollments in ANGEL from the SIS. Based upon an enrollment status field in the SIS, a student could be enrolled in the course, disabled from the course, or unenrolled from the course.

13. If Conditional Actions are necessary, select the **Add Conditional Action** link. If Conditional Actions are not needed, go directly to Step 16.

The screenshot shows the 'XEI Agent' configuration page in the ANGEL Learning Management Suite. The page title is 'XEI Agent' and the sub-section is '6. Actions'. The main heading reads: 'Choose which actions you want to have taken for each record in your data source. Conditional actions allow you to change the action based on properties in the source record. The default action will apply to any record that has not been processed by conditional actions.' There are two main sections: 'Conditional Actions' with a link 'Add Conditional Action', and 'Default Action' with a dropdown menu currently set to 'Add/Update'. Below these are an 'Advanced' button with the text 'Configure custom processes and dependent jobs.', a checkbox for 'Stop processing on first failed record.', and three buttons: 'Previous', 'Finish', and 'Cancel'.

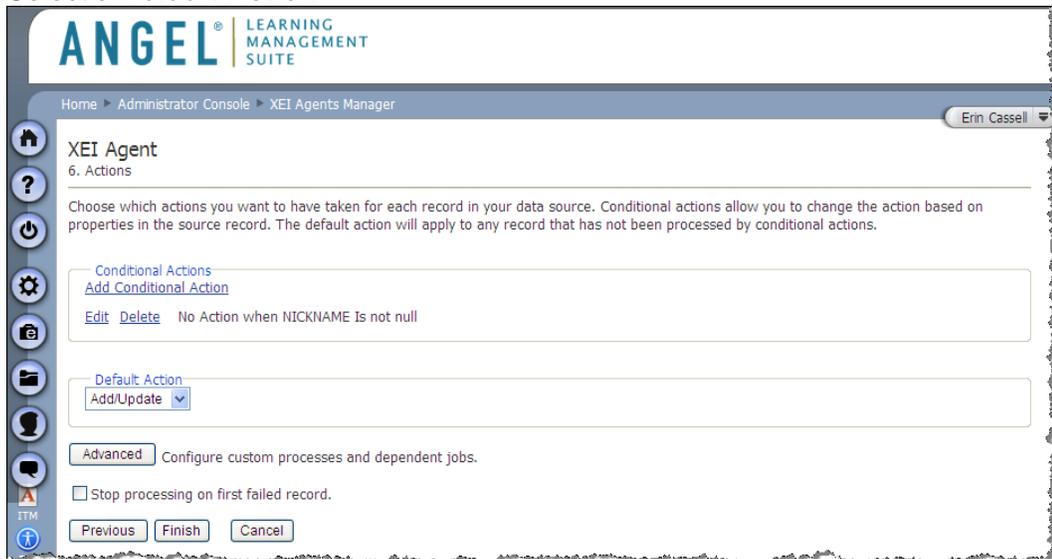
14. Select an **Action** from the pick-list and define the **Conditions** for that action. More than one condition can be added for the action by select **Add Condition**.

The screenshot shows the 'XEI Agent' configuration page in the ANGEL Learning Management Suite, specifically the 'Conditional Actions' section. The main heading reads: 'Select an action that you would like to perform on a record, and the conditions about when that action will occur.' A dropdown menu is set to 'Add/Update' with the text 'Any record where:'. Below this is a 'Conditions' section with a dropdown menu set to 'USER_ID', a dropdown menu set to 'Contains', and an empty text input field. There is a 'Delete Condition' link to the right of the input field. Below the conditions section is an 'Add Condition' link and 'OK' and 'Cancel' buttons.

Screen Option	Description
Action Type	Type of Action to perform when the defined conditions are met. Available choices are: <ul style="list-style-type: none"> • Add/Update – Adds when record does not exist and updates when it does. • Update Only – Only updates records that already exist. Does not add new records. • Add Only – Only adds if record does not exist. Does not update existing records. • Delete Only – Deletes existing • No Action – Performs no action
Source Fields	Listing of available fields from the data source
Comparison Operators	Listing of available comparison operators
Comparison Value	Value to match for comparison of the condition.

15. Select **OK**

16. Select a **Default Action**

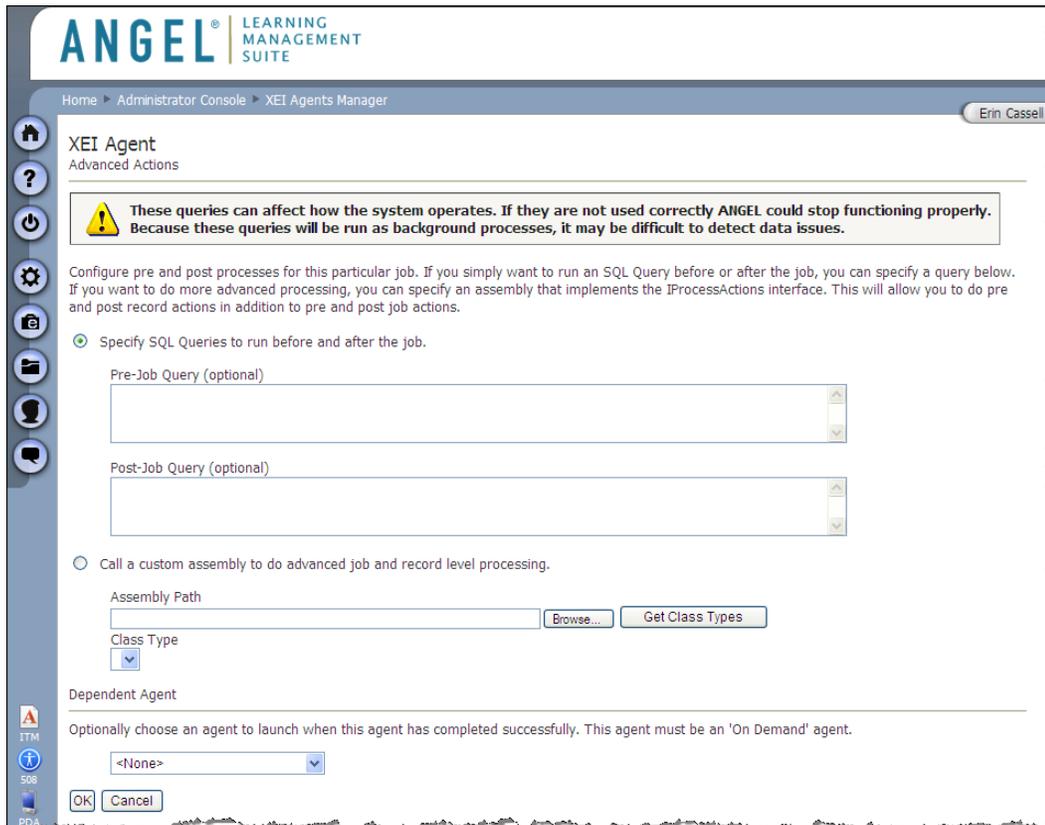


17. If advanced options are required, select **Advanced**.

These options would include any pre- or post-processing of data at the record or job level.

 Advanced options such as this should only be preformed by someone very comfortable with the XEI Agents Manager and the data been provided by the SIS. Queries defined through this option will affect how the system operates. If they are not used correctly ANGEL could stop functioning properly. Because these queries will be run as background processes, it may be difficult to detect data issues.

18. Populate any **Pre-Job Query**, **Post-Job Query**, or **Custom Assembly**. If an additional agent needs to run upon completion of this agent, it can be selected from the pick-list at the bottom.



Screen Option	Description
Pre-Job Query	Query to run prior to the job has begun.
Post-Job Query	Query to run after the job is completed.
Assembly Path	Path to the assembly that will implement the interface for pre- and post-processes.
Class Type	List of types available based upon the assembly path specified.
Dependant Agent	<p>“On Demand” Agent that should run after the agent is complete.</p> <p>An example of this would be during the archival process of courses older than a specified amount of time. The first agent would delete all of the courses that are no longer in the system, and the second agent would run immediately to remove the individuals from the roster of those courses deleted.</p>

19. Select **OK**
20. If you would like processing to stop if a record fails, check the box **Stop processing on first failed record**.



This option is very helpful option when testing new agents.

21. Select **Finish**.

22. Check the confirmation message at the top of the Summary screen and confirm that your agent has been added to the list.



Method 2: File Systems Agents

The File System method of integration provides a highly flexible option for integration. Most systems provide a methodology for exporting data into either CSV format which then can be consumed for use within ANGEL.

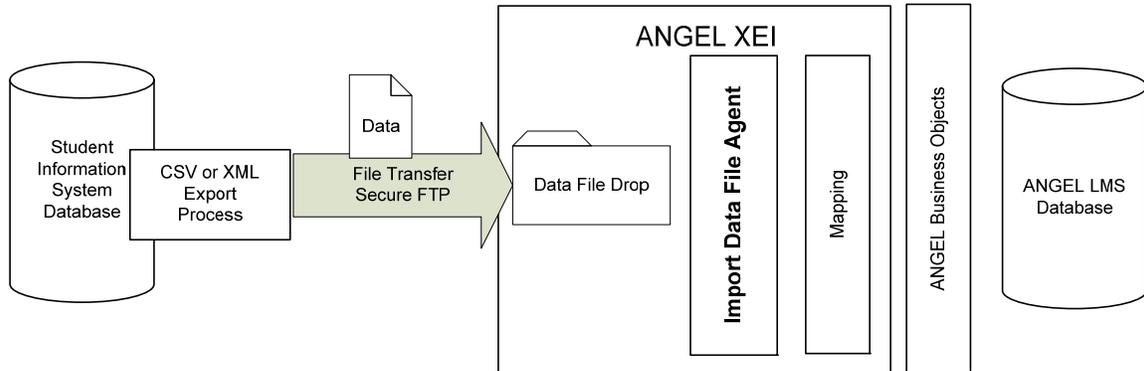


Figure 5. File System Method of Integration

Security Considerations

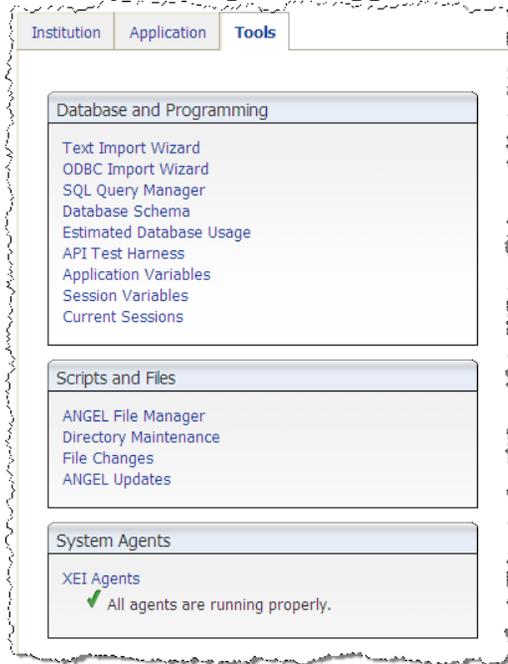
If the data being transferred from the source system to the ANGEL application server is sensitive in nature, a Secure FTP (File Transfer Protocol) should be considered. This is specifically true for ANGEL-hosted customers but may also apply to self-hosted customers based upon the security strategy of the institution.

Agent Setup

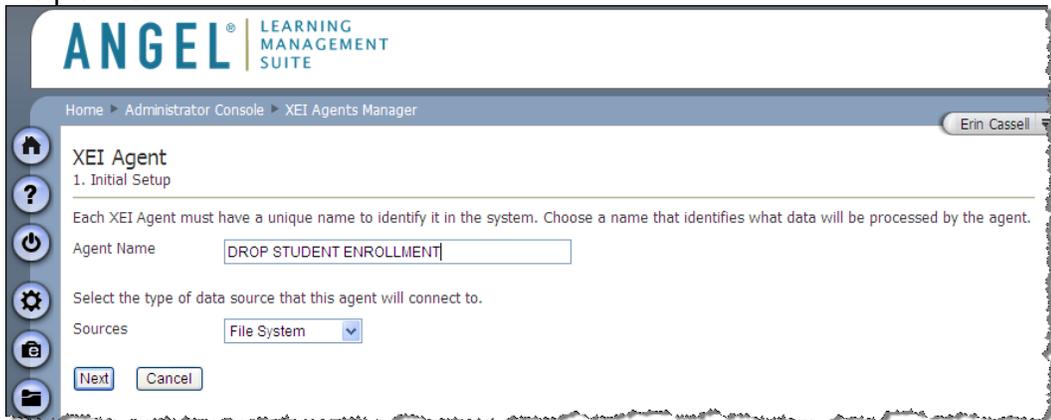
Step 1: Initial Setup

The initial setup step for XEI is consistent regardless of the method of integration. During this step, the agent will be named and method of integration will be defined.

1. Launch the XEI Agent Manager by going to **Administrators Console > Tools Tab > System Agents Nugget > XEI Agents**



2. Under the XEI Agents Manager Title select **Add Agent**
3. Populate the XEI Agent page with the **Agent Name** and select **File System** from the pick-list



Screen Option	R/O/C	Description
Agent Name	R	User-defined name of the agent.  A best practice recommendation is that type of data being transferred and the action of the agent is included in the name of agent (e.g. ADD ACCOUNTS, DROP ENROLLMENTS, etc.)
Sources	R	List of available adapters that can be used to integrate. This option is important as it will define the rest of the set-up process.

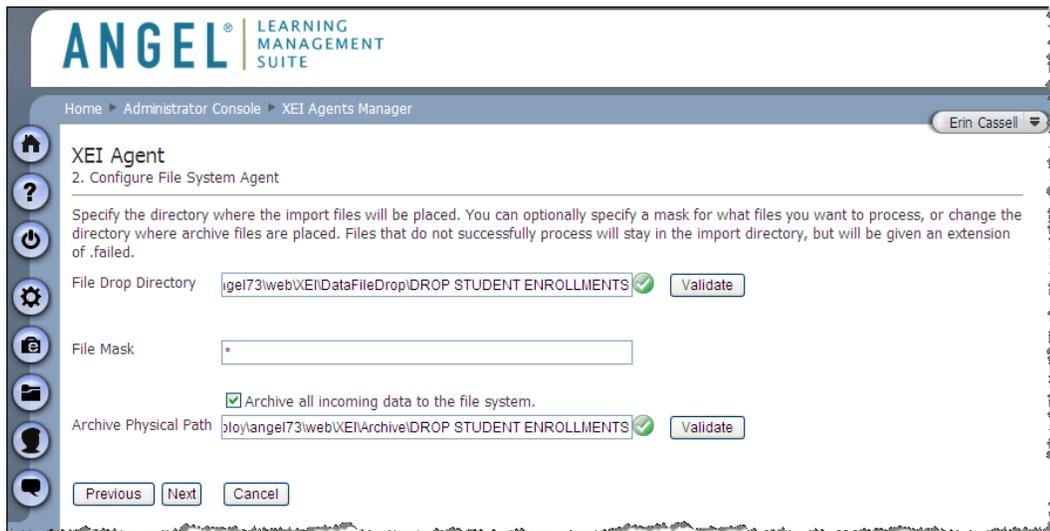
4. Select **Next**

Step 2: Configure File System Agent

This screen will define the directory in which the source file will be placed for processing. The file will be chosen from the specified directory path. Once the file is processed the name will be modified with a date/time stamp to ensure uniqueness and moved to the designated archive directory.

 The archive directory must be manually maintained; therefore, an archival strategy should be developed to remove files from the directory on a regular basis.

5. Populate the **File Drop Directory**, **File Mask** and **Archive Physical Path** fields. The Validate buttons check the specified path and permissions of that path and prompt to create the directory if it does not exist.



Screen Option	R/O/C	Description
File Drop Directory	R	Directory path to the directory location where the source files will be placed for processing.
File Mask	R	Masks the file to process. For example if only XML file should be processed, the value should be *.xml. The default is set to * and should remain that if all files regardless of extension should be processed in the directory.
Archive Physical Path	R	Directory where files will be placed after processing. The default value for this path is [XEI Root]\Archives\[Job Name]

6. Select **Next**

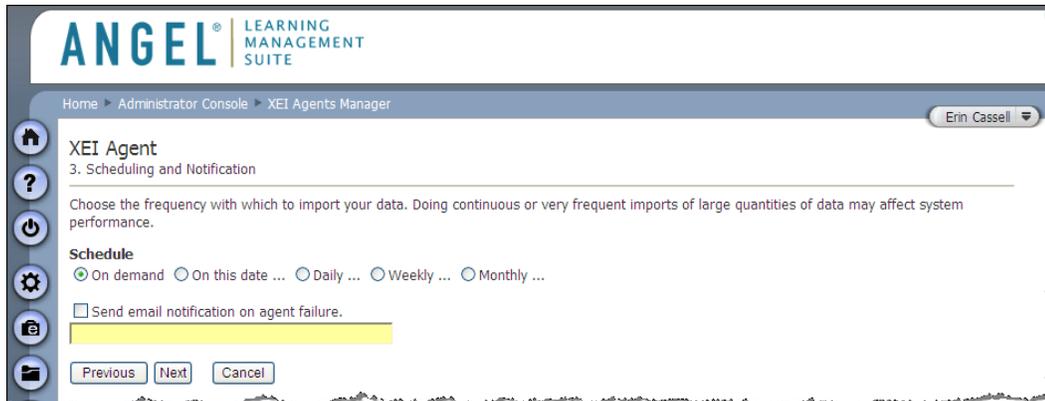
 Upon selecting Next, the wizard automatically validates whether the specified folders can be accessed and whether the service has the proper permissions. If the validation fails, a prompt will be displayed and the configuration cannot continue. See Appendix D for a listing of errors and their explanations.

Step 3: Scheduling and Notification

This screen allows administration of when the data will come in to the ANGEL system. By doing this, the ANGEL administrator can balance the convenience of having up-to-date data against performance hits to the system.

 If a process exists that uploads a batch file at a specific point in the day, the agent will need to be scheduled to run after the file is uploaded.

7. Select the appropriate radio button for the **Schedule**.
If notification on failure is required, check the **Send email notification** checkbox and populate the **Notification Email Address**.



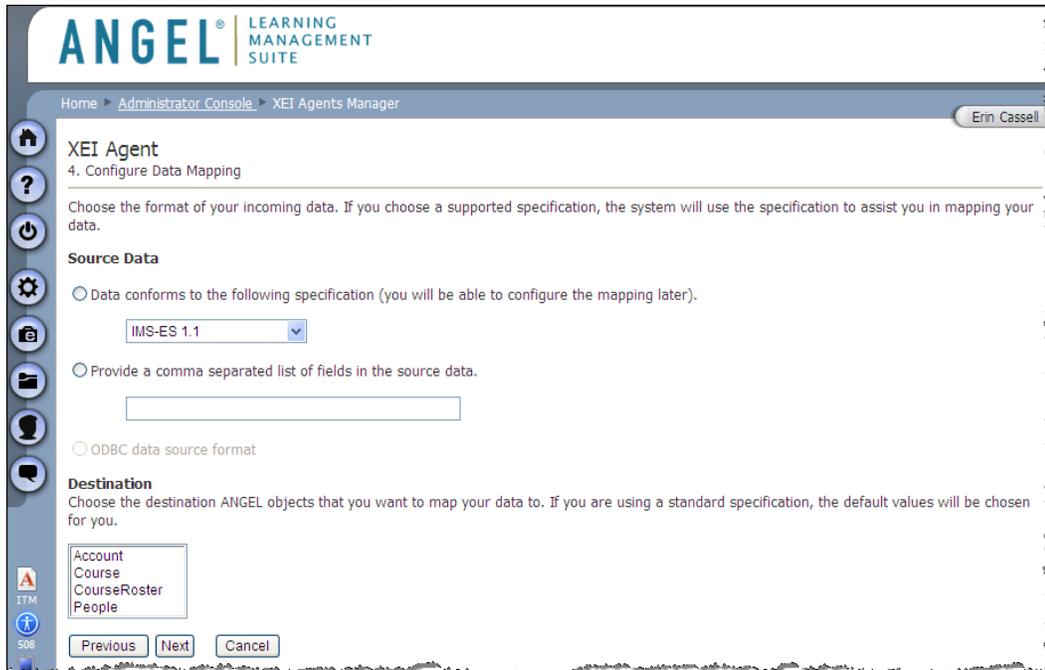
Screen Option	R/O/C	Description
Schedule	R	Frequency with which data will be imported or exported. Note that depending on the radio button selected, additional fields may need to be populated.
Notification Email Address	C	Email address that should receive notifications upon failure of an agent. Conditionally used based on the checkbox above the email field.

8. Select **Next**

Step 4: Configure Data Mapping

This step defines the specification for the source data and destination table in ANGEL for which the data should be mapped. Only one source is allowed under source data and if the second option is chosen, a comma separated list must be provided in the input box.

9. Select a radio button under the **Source Data** heading (if applicable) and the **Destination** table for the data



Screen Option	R/O/C	Description
Source Data	O	Options for specifying the specifications of the source data file. If the file is based upon a data processor known by ANGEL, the first option should be selected. If a specification is not available, one can be provided in a comma separated list by using the second option. These values provide a mechanism to map the data from the source system to the ANGEL Business Objects.
Destination	R	Listing of tables available to which data can be mapped. Multiple tables can be selected from the given list for processing.

10. Select **Next**

Step 5: Map Data

This step provides the ability to map data to the fields in the ANGEL database object selected in the previous step. The Custom option allows for concatenation or formatting of the field when appropriate.

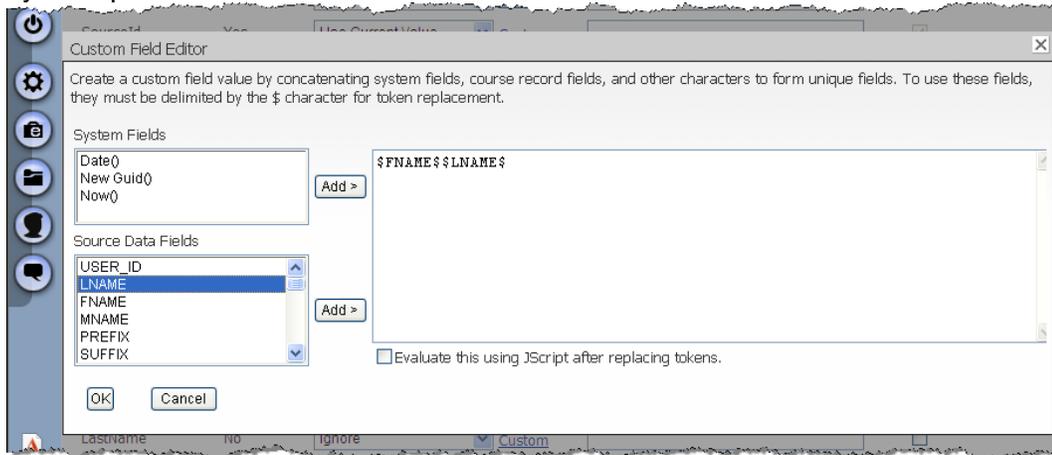
11. Select the appropriate option from the **Source Field** drop-down, populate **Default Value** (where appropriate), and check or uncheck **Insert only** (where appropriate and available).

Column/Screen Option	R/O/C	Description
ANGEL Field	R	Listing of all of the fields available in the ANGEL Business Object.
Required	R	Displays whether the field is a required field in the ANGEL object.
Source Fields	R	<p>Pick-list of available fields for the source data store to which the field should be mapped. A series of defined values are also available for selection:</p> <ul style="list-style-type: none"> • Ignore – Ignores the field for import • Null – Set the field to null • New Guid() – Automatically creates a globally unique identifier • Now() - Date/Timestamp that represents the time when the record is processed • Empty String – Sets the field to an empty string • Use Current Value – use the value currently in the database • Always use Default – Tells the agent to always use the default value even if a value is provided from the source data store <p> As an additional tool, the auto select option can be chosen next to Source Field to</p>

Column/Screen Option	R/O/C	Description
		automatically select fields with different names.
Custom	<input type="radio"/>	Allows for concatenation or formatting of the field where appropriate.
Default Value	<input type="radio"/>	Creates a default value that will be used if no value is found in the source data store if populated
Insert Only	<input type="radio"/>	If checked, the column will only be added on a new record; otherwise the column will not be affected.

Custom Field Editor

This pop-up allows for custom fields by concatenation of fields and other text to create meaningful data for the field. Custom fields can optionally be evaluated by JScript for each record.



Screen Option	Description
System Fields	Listing of tokenized values that can be inserted into a phrase of concatenated values. When added, it appears in its \$TOKEN\$ view in the right-hand pane.
Source Data Fields	Listing of the available data fields from the source data store.
Token Pane	Pane that displays the tokenized phrase that will be used on each record upon import.

12. Select Next



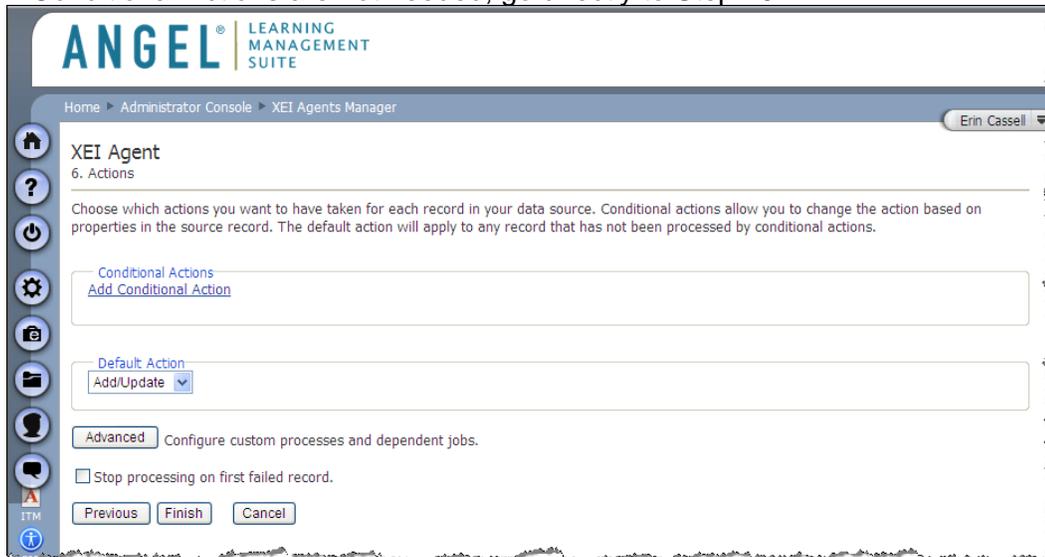
Upon selecting Next, the wizard automatically validates the data type of the source field with the data type of the ANGEL object field. If any type mismatch is found, a type mismatch error will be displayed with the fieldname of the mismatch.

Step 6: Actions

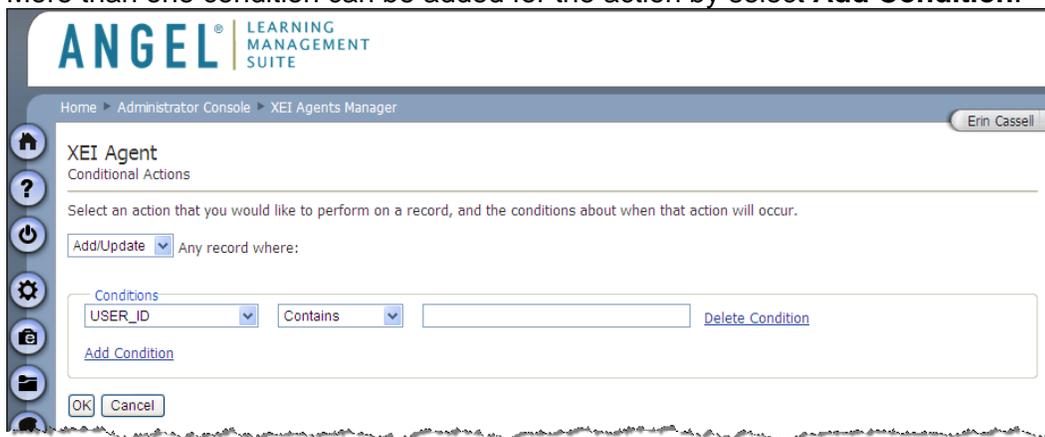
This step defines what processing needs to be completed on each record. The action can be controlled by a field in the record or it may just take a default action. A variety of conditional actions can be defined, which allows for different records to be treated in a specific fashion based on a record-level condition.

An example of this would be to update enrollments in ANGEL from the SIS. Based upon an enrollment status field in the SIS, a student could be enrolled in the course, disabled from the course, or unenrolled from the course.

13. If Conditional Actions are necessary, select the **Add Conditional Action** link. If Conditional Actions are not needed, go directly to Step 16.



14. Select an **Action** from the pick-list and define the **Conditions** for that action. More than one condition can be added for the action by select **Add Condition**.

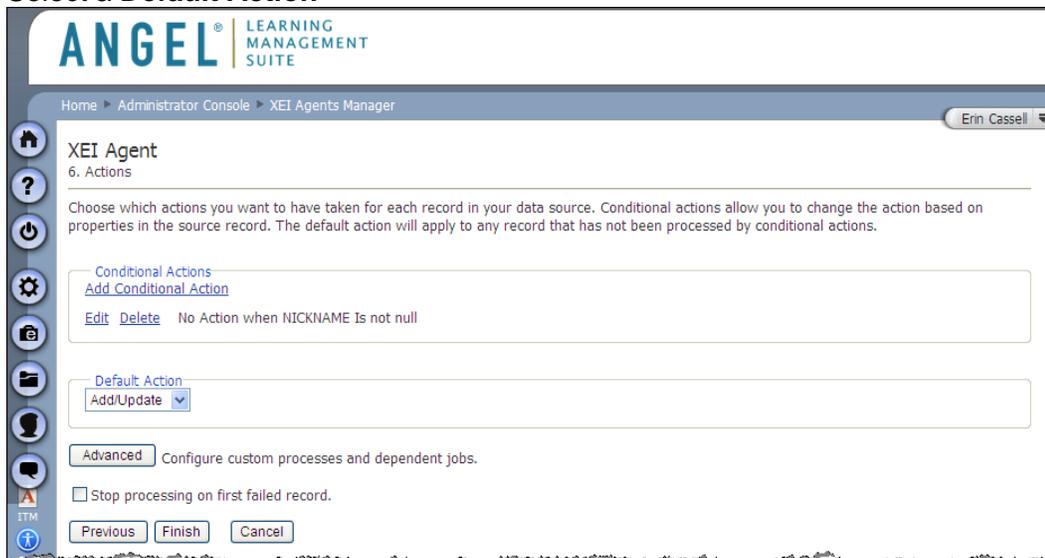


Screen Option	Description
Action Type	Type of Action to perform when the defined conditions are met. Available choices are: <ul style="list-style-type: none"> • Add/Update – Adds when record does not exist and updates when it does. • Update Only – Only updates records that already

Screen Option	Description
	exist. Does not add new records. <ul style="list-style-type: none"> • Add Only – Only adds if record does not exist. Does not update existing records. • Delete Only – Deletes existing • No Action – Performs no action
Source Fields	Listing of available fields from the data source
Comparison Operators	Listing of available comparison operators
Comparison Value	Value to match for comparison of the condition.

15. Select **OK**

16. Select a **Default Action**



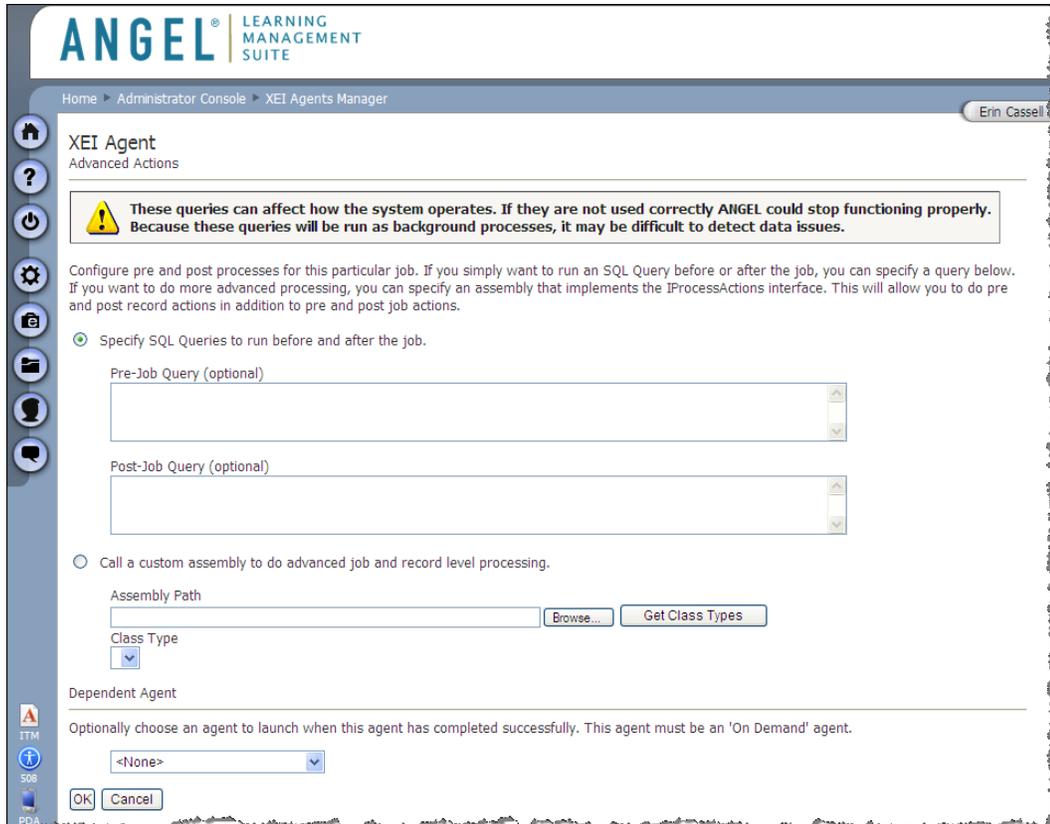
17. If advanced options are required, select **Advanced**.

These options would include any pre- or post-processing of data at the record or job level.

 Advanced options such as this should only be preformed by someone very comfortable with the XEI Agents Manager and the data been provided by the SIS. Queries defined through this option will affect how the system operates. If they are not used correctly ANGEL could stop functioning properly. Because these queries will be run as background processes, it may be difficult to detect data issues.

18. Populate any **Pre-Job Query**, **Post-Job Query**, or **Custom Assembly**.

If an additional agent needs to run upon completion of this agent, it can be selected from the pick-list at the bottom.



Screen Option	Description
Pre-Job Query	Query to run prior to the job has begun.
Post-Job Query	Query to run after the job is completed.
Assembly Path	Path to the assembly that will implement the interface for pre- and post-processes.
Class Type	List of types available based upon the assembly path specified.
Dependant Agent	<p>“On Demand” Agent that should run after the agent is complete.</p> <p>An example of this would be during the archival process of courses older than a specified amount of time. The first agent would delete all of the courses that are no longer in the system, and the second agent would run immediately to remove the individuals from the roster of those courses deleted.</p>

19. Select **OK**

20. If you would like processing to stop if a record fails, check the box **Stop processing on first failed record.**



This option is very helpful option when testing new agents.

21. Select **Finish**.

22. Check the confirmation message at the top of the Summary screen and confirm that your agent has been added to the list.



Method 3: Messaging Agents

The Messaging method of integration provides the ability to receive data messages from a variety of data sources. The method is based on XML Web Services.

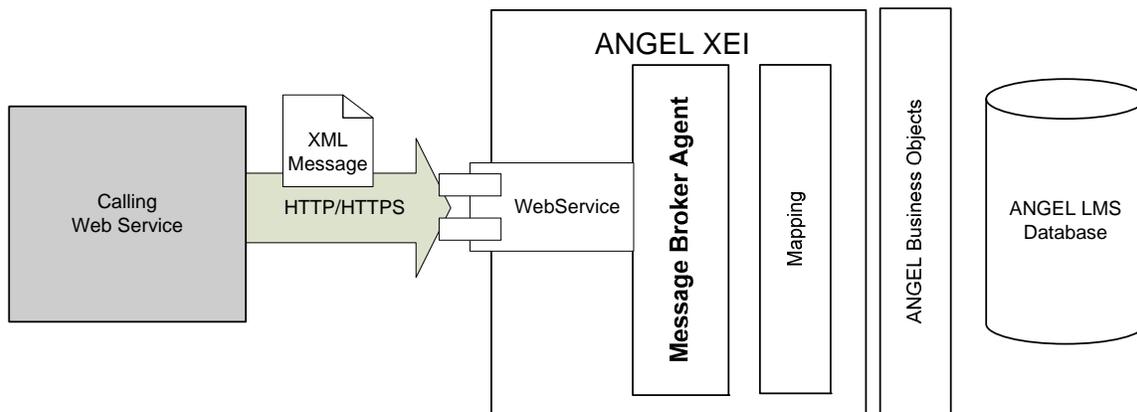


Figure 6. Message Broker Method of Integration

Security Considerations

Message Authentication

Authentication and rejection of incoming messages is the responsibility of the message broker.

HTTP requests are authenticated by the `HttpMessageBroker` which supports the Basic Authentication method.

Authentication credentials are verified against the current ANGEL installation. If no credentials are supplied, or the supplied credentials were refused, the `HttpMessageBroker` will respond with a 401 Unauthorized error message.

Authentication is implicit when using `FileMessageBroker`; therefore, steps must be taken to ensure the security of the directories being monitored by the `FileMessageBroker`.

Message Encryption

When messaging remote data sources, some form of security will be required. This is specifically true for ANGEL-hosted customers but may also apply to self-hosted customers based upon the security strategy of the institution, and SSL communication is highly recommended to ensure the security of HTTP messages.

Agent Setup

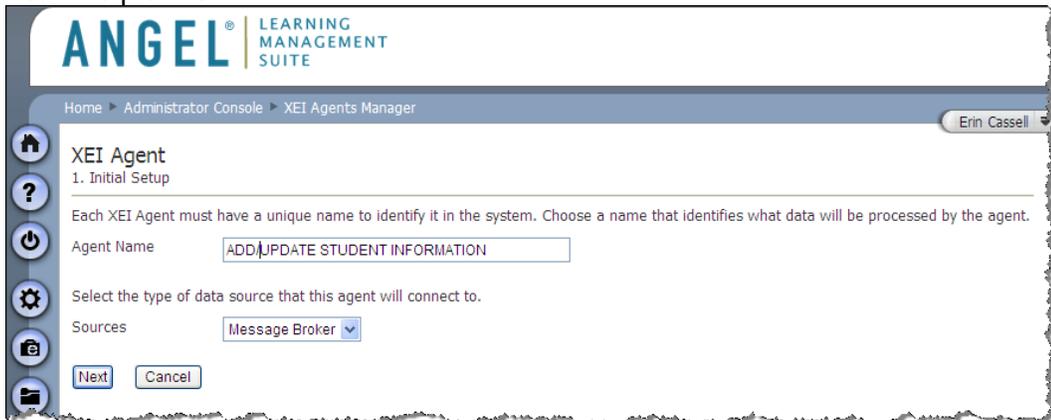
Step 1: Initial Setup

The initial setup step for XEI is consistent regardless of the method of integration. During this step, the agent will be named and method of integration will be defined.

1. Launch the XEI Agent Manager by going to **Administrators Console > Tools Tab > System Agents Nugget > XEI Agents**



2. Under the XEI Agents Manager Title select **Add Agent**
3. Populate the XEI Agent page with the **Agent Name** and select **Message Broker** from the pick-list



Screen Option	R/O/C	Description
Agent Name	R	User-defined name of the agent.  A best practice recommendation is that type of data being transferred and the action of the agent is included in the name of agent (e.g. ADD ACCOUNTS, DROP ENROLLMENTS, etc.)
Sources	R	List of available adapters that can be used to integrate. This option is important as it will define the rest of the set-up process.

4. Select **Next**

Step 2: Configure Message Broker Agent

This screen will define the URL or IP address of the remote messaging service or the caller of the integration framework web service. Every message received will be validated to make sure that it has come from the proper address, and the username/password combination will be validated as a specific user. Messages are processed in the order they are received from the remote messaging service.



The archive directory must be manually maintained; therefore, an archival strategy should be developed to remove files from the directory on a regular basis.

5. Populate the **IP Address**, **Security** and **Archive Directory** fields
The Validate button checks the specified path and permissions of that path and prompts if there is an error during validation.

Screen Option	R/O/C	Description
IP Address	R	URL or IP Address of the remote messaging service. This address will be validated and only messages from it will be processed. The Require SSL checkbox should be checked if SSL should be enforced.
Security	R	Username of the ANGEL user that has access to perform this job. The username and associated password must be specified in the header of the message.
Archive Directory	C	Directory where files will be placed after processing. This field is conditional based upon the checkbox directly above it. If the checkbox is checked, the field will be available to be populate otherwise it will be unavailable.

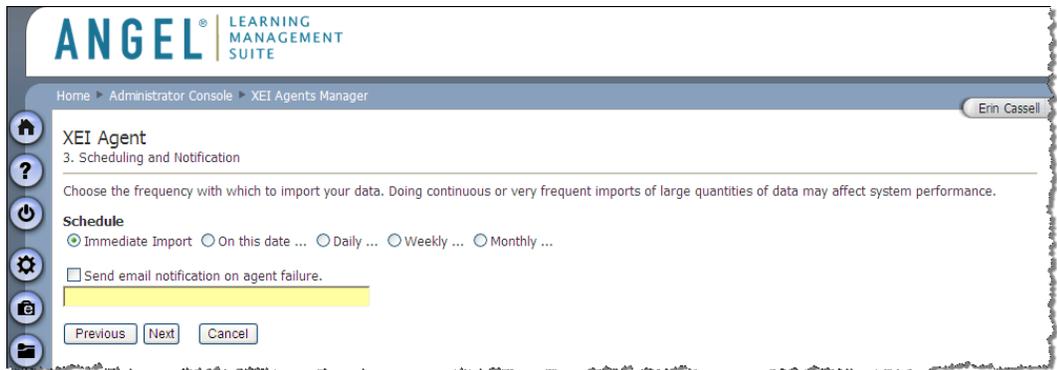
6. Select **Next**

 Upon selecting Next, the wizard automatically validates the format of the address and attempts to communicate with the remote message service to ensure the ports and other settings are properly configured. If the validation fails, a prompt will be displayed and the configuration cannot continue. See Appendix D for a listing of errors and their explanations.

Step 3: Scheduling and Notification

This screen allows administration of when the data will come in to the ANGEL system. By doing this, the ANGEL administrator can balance the convenience of having up-to-date data against performance hits to the system.

7. Select the appropriate radio button for the **Schedule**.
If notification on failure is require, check the **Send email notification** checkbox and populate the **Notification Email Address**.



Screen Option	R/O/C	Description
Schedule	R	Frequency with which data will be imported or exported. Note that depending on the radio button selected, additional fields may need to be populated.  One of the primary reasons messaging agents are used is for immediate synchronization. If the agent is not set to immediate, the messages will be queued and processed the next time the agent is run.
Notification Email Address	C	Email address that should receive notifications upon failure of an agent. Conditionally used based on the checkbox above the email field.

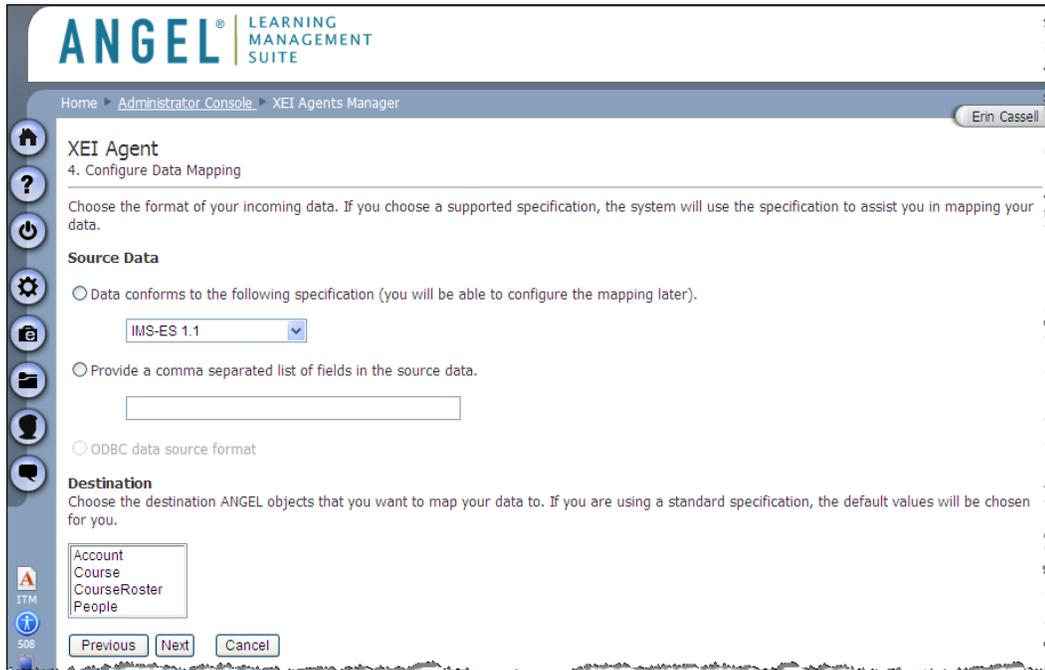
8. Select **Next**

Step 4: Configure Data Mapping

This step defines the specification for the source data and destination object in ANGEL to which the data should be mapped. Only one choice is allowed under source data and

if the second option is chosen, a comma separated list must be provided in the input box.

9. Select a radio button under the **Source Data** heading (if applicable) and the **Destination** table for the data



Screen Option	R/O/C	Description
Source Data	O	Options for specifying the specifications of the source data file. If the file is based upon a data processor known by ANGEL, the first option should be selected. If a specification is not available, one can be provided in a comma separated list by using the second option.
Destination	R	Listing of tables available to which data can be mapped.  Multiple tables can be selected from the given list for processing.

10. Select **Next**

Step 5: Map Data

This step provides the ability to map data to the fields in the ANGEL database object selected in the previous step. The Custom option allows for concatenation or formatting of the field when appropriate.

11. Select the appropriate option from the **Source Field** drop-down, populate **Default Value** (where appropriate), and check or uncheck **Insert only** (where

appropriate and available).

ANGEL® LEARNING MANAGEMENT SUITE

Home > Administrator Console > XEI Agents Manager Erin Casse

XEI Agent
5. Map Data

Choose how you want to map your data into the ANGEL system. The source fields come from your defined data source. Select the field that you want to map, and choose a destination field to input the data. You may also specify a default value for any field.

Account

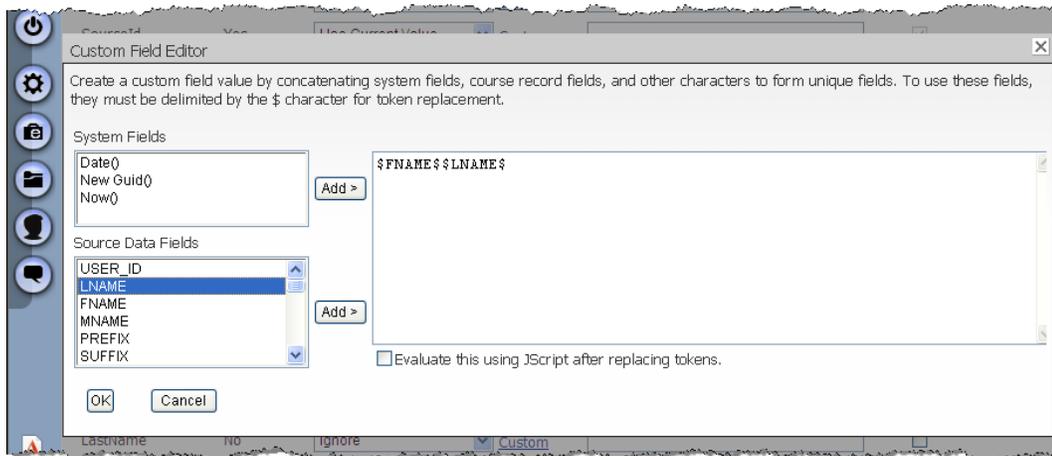
ANGEL Field	Required	Source Field (auto select)	Default Value	Insert Only
Username	Yes	person/sourcedid/id/text()	Custom	<input checked="" type="checkbox"/>
Email	No	person/email/text()	Custom	<input type="checkbox"/>
SourceId	Yes	person/sourcedid/id/text()	Custom	<input checked="" type="checkbox"/>
LoginName	Yes	person/userid/text()	Custom	<input type="checkbox"/>
AccountExpires	No	Ignore	Custom	<input type="checkbox"/>
AccountGroup	No	Ignore	Custom	<input type="checkbox"/>
AccountRights	No	Ignore	Custom	<input type="checkbox"/>
AccountSource	No	Ignore	Custom	<input type="checkbox"/>
AccountStatus	No	Ignore	Custom	<input type="checkbox"/>
AccountType	No	Ignore	Custom	<input type="checkbox"/>
Attributes	No	Ignore	Custom	<input type="checkbox"/>

Column/Screen Option	R/O/C	Description
ANGEL Field	R	Listing of all of the fields available in the ANGEL Business Object.
Required	R	Displays whether the field is a required field in the ANGEL object.
Source Fields	R	<p>Pick-list of available fields for the source data store to which the field should be mapped. A series of defined values are also available for selection:</p> <ul style="list-style-type: none"> • Ignore – Ignores the field for import • Null – Set the field to null • New Guid() – Automatically creates a globally unique identifier • Now() – Date/Timestamp that represents the time when the record is processed • Empty String – Sets the field to an empty string • Use Current Value – use the value currently in the database • Always use Default – Tells the agent to always use the default value even if a value is provided from the source data store <p> As an additional tool, the auto select option can be chosen next to Source Field to</p>

Column/Screen Option	R/O/C	Description
		automatically select fields with different names.
Custom	O	Allows for concatenation or formatting of the field where appropriate.
Default Value	O	Creates a default value that will be used if no value is found in the source data store if populated
Insert Only	O	If checked, the column will only be added on a new record; otherwise the column will not be affected.

Custom Field Editor

This pop-up allows for custom fields by concatenation of fields and other text to create meaningful data for the field. Custom fields can optionally be evaluated by JScript for each record.



Screen Option	Description
System Fields	Listing of tokenized values that can be inserted into a phrase of concatenated values. When added, it appears in its \$TOKEN\$ view in the right-hand pane.
Source Data Fields	Listing of the available data fields from the source data store.
Token Pane	Pane that displays the tokenized phrase that will be used on each record upon import.

12. Select Next

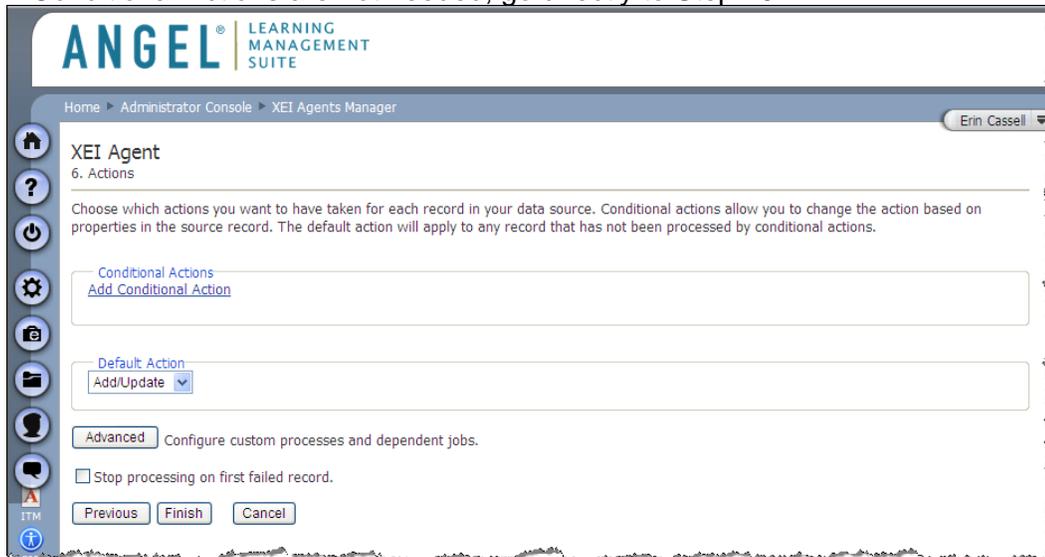
 Upon selecting Next, the wizard automatically validates the data type of the source field with the data type of the ANGEL object field. If any type mismatch is found, a type mismatch error will be displayed with the fieldname of the mismatch.

Step 6: Actions

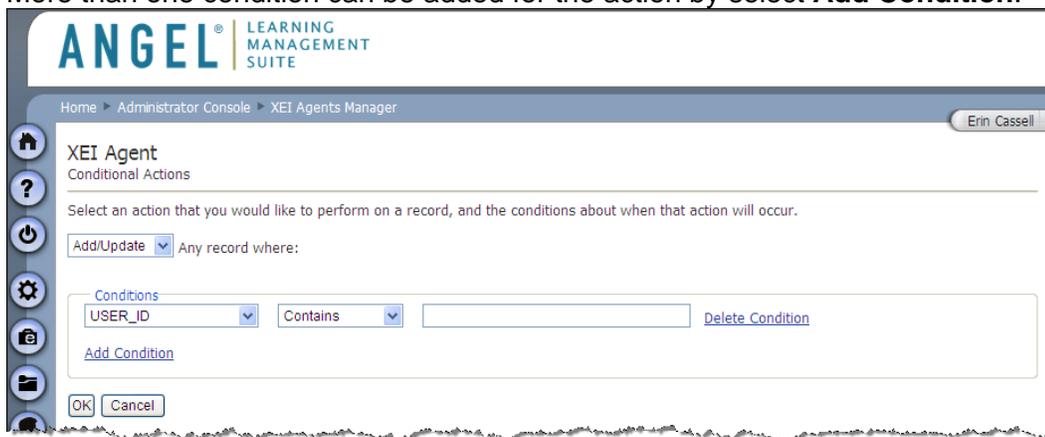
This step defines what processing needs to be completed on each record. The action can be controlled by a field in the record or it may just take a default action. A variety of conditional actions can be defined, which allows for different records to be treated in a specific fashion based on a record-level condition.

An example of this would be to update enrollments in ANGEL from the SIS. Based upon an enrollment status field in the SIS, a student could be enrolled in the course, disabled from the course, or unenrolled from the course.

13. If Conditional Actions are necessary, select the **Add Conditional Action** link. If Conditional Actions are not needed, go directly to Step 16.



14. Select an **Action** from the pick-list and define the **Conditions** for that action. More than one condition can be added for the action by select **Add Condition**.

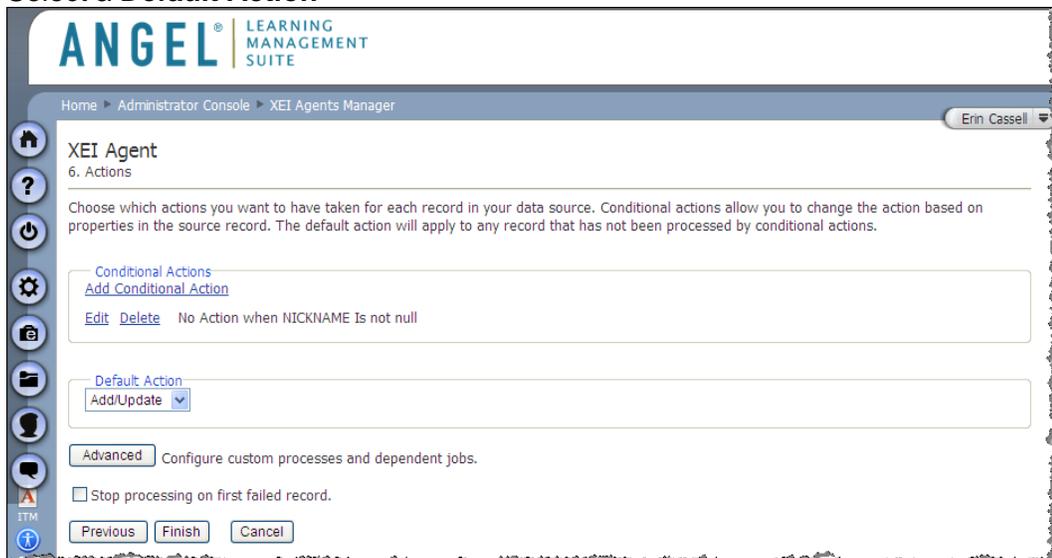


Screen Option	Description
Action Type	Type of Action to perform when the defined conditions are met. Available choices are: <ul style="list-style-type: none"> • Add/Update – Adds when record does not exist and updates when it does. • Update Only – Only updates records that already

Screen Option	Description
	exist. Does not add new records. <ul style="list-style-type: none"> • Add Only – Only adds if record does not exist. Does not update existing records. • Delete Only – Deletes existing • No Action – Performs no action
Source Fields	Listing of available fields from the data source
Comparison Operators	Listing of available comparison operators
Comparison Value	Value to match for comparison of the condition.

15. Select **OK**

16. Select a **Default Action**



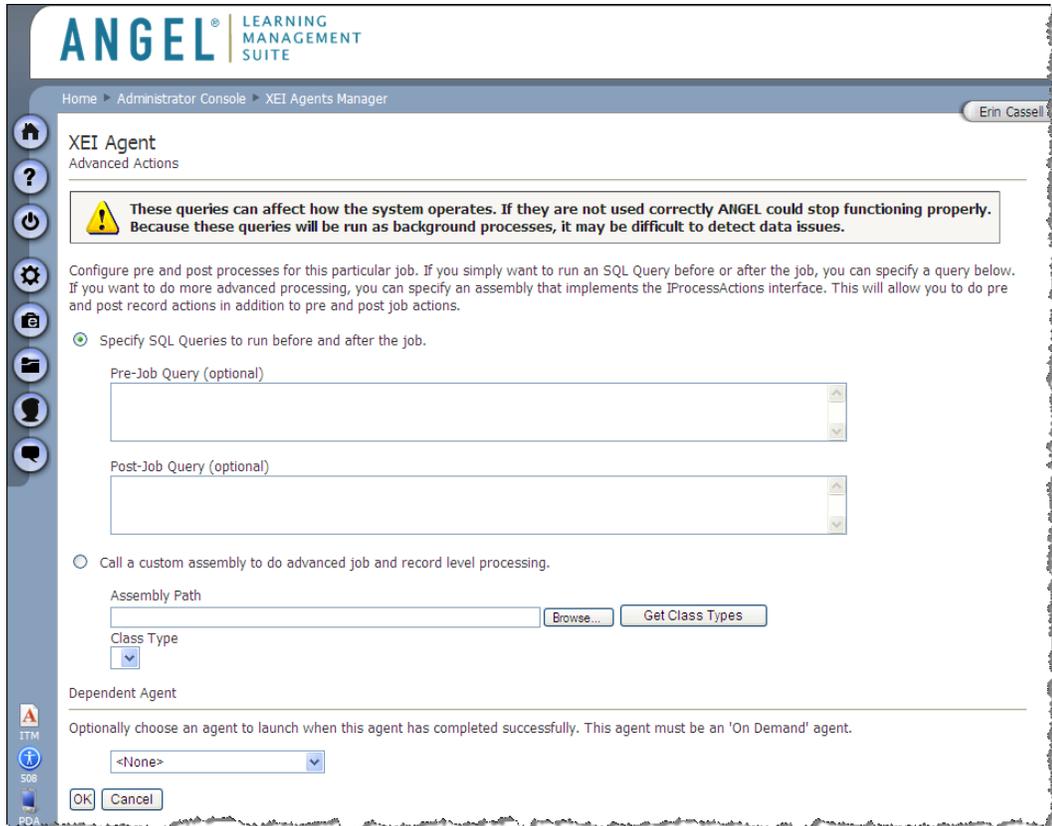
17. If advanced options are required, select **Advanced**.

These options would include any pre- or post-processing of data at the record or job level.

 Advanced options such as this should only be preformed by someone very comfortable with the XEI Agents Manager and the data been provided by the SIS. Queries defined through this option will affect how the system operates. If they are not used correctly ANGEL could stop functioning properly. Because these queries will be run as background processes, it may be difficult to detect data issues.

18. Populate any **Pre-Job Query**, **Post-Job Query**, or **Custom Assembly**.

If an additional agent needs to run upon completion of this agent, it can be selected from the pick-list at the bottom.



Screen Option	Description
Pre-Job Query	Query to run prior to the job has begun.
Post-Job Query	Query to run after the job is completed.
Assembly Path	Path to the assembly that will implement the interface for pre- and post-processes.
Class Type	List of types available based upon the assembly path specified.
Dependant Agent	<p>“On Demand” Agent that should run after the agent is complete.</p> <p>An example of this would be during the archival process of courses older than a specified amount of time. The first agent would delete all of the courses that are no longer in the system, and the second agent would run immediately to remove the individuals from the roster of those courses deleted.</p>

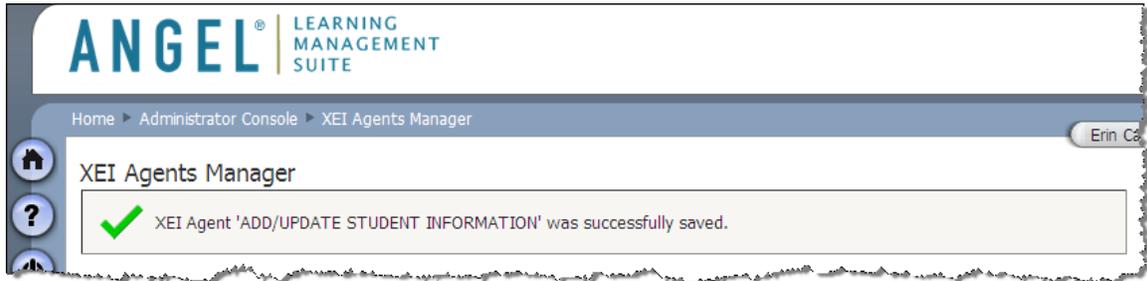
19. Select **OK**

20. If you would like processing to stop if a record fails, check the box **Stop processing on first failed record**.

 This option is very helpful option when testing new agents.

21. Select **Finish**.

22. Check the confirmation message at the top of the Summary screen and confirm that your agent has been added to the list.



Method 4: Hybrid-Hosted Integrations

This Hybrid-Hosted method of implementation provides a secure option for transmission of data between an institution's securely-hosted ANGEL LMS and a self-hosted Student Information System. This option uses the messaging Agent with the Remote Data Integration Utility to make secure data transfers.

If an institution is interested in pursuing this method of integration, it should contact ANGEL support at <http://support.angellearning.com>.

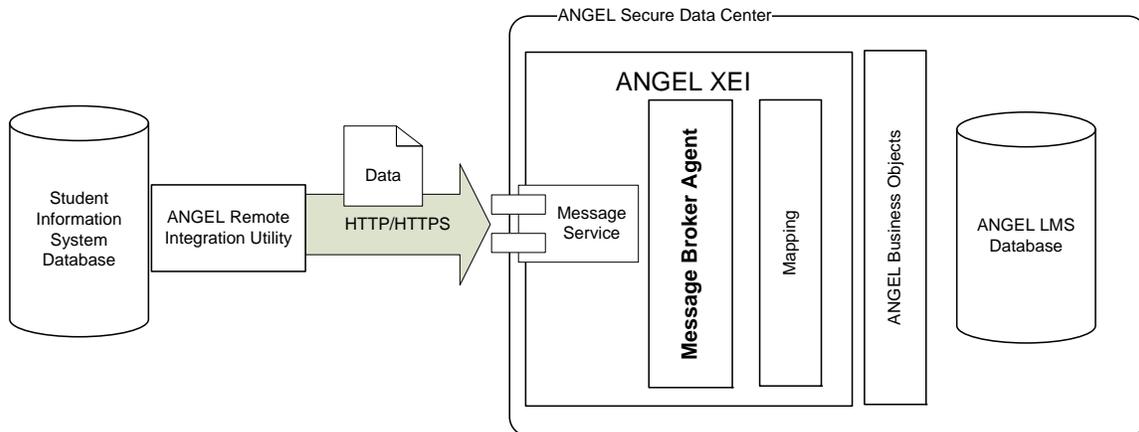


Figure 7. Hybrid-Hosted Integrations

Appendix A: Upgrading from 7.2

Overview

The ANGEL 7.3 Installer will automatically upgrade XEI to the most recent version. As part of this process, all current XEI jobs will be migrated to XEI ODBC Agents. While this upgrade will maintain all existing mappings, there have been some schema changes to the accounts table, which may affect the mappings. All 7.2 XEI configuration environment variables have been deprecated, and are no longer valid.

Recommendations

After successfully upgrading from 7.2 to 7.3, you should perform the following tasks:

- Review and test all jobs migrated from 7.2 to 7.3.
- Review the new options available in 7.3 and determine if any of your jobs can be and should be migrated to a new method of integration.
- Complete the following steps if you decide to replace any 7.2 jobs with a new 7.3 job:
 - Remove the DSN no longer being used
 - Delete the old, ODBC-based agent
- Review the Hybrid-Hosting option if you are an ANGEL-hosted customer. Contact Customer Support if you would like to find out further information.
- Review the new fields available in the Accounts table and alter the way that your integration with the Accounts table works if applicable for your institution.

Appendix B: XEI Data Mapping Subject Areas

Accounts

ANGEL Business Object	ANGEL Database Field (Accounts Table)	Description	Data Type (Size)
Username	USERNAME	This field used to be the ANGEL login name for users. This field maps to the USER_ID field in all other database tables.	nvarchar(100)
Sourceld	Sourceld	The unique identifier for each account in the system. This field is stored in this table for the purposes of synchronizing this account with other systems. It is not viewable or passed through the environment.	nvarchar(100)
LoginName	LoginName	This is a new field for ANGEL 7.3 and stores ANGEL login name for a user.	nvarchar(100)
AccountExpires	ACCOUNT_EXPIRES	The date in which an account has been set to expire.	datetime
AccountGroup	ACCOUNT_GROUP	Links to the ACCOUNT_GROUPS table – is used to associate a user with a specific account group.	nvarchar(50)
AccountRights	ACCOUNT_RIGHTS	The system (or environment) level rights for this user. Can be 64 for administrator, 32 for editor (some administration privileges), 16 for Manager, 8 for faculty, 4 for staff, 2 for student, or 0 for public privileges only.	smallint
AccountSource	ACCOUNT_SOURCE	Specifies the source of the account. Information.	nvarchar(100)
AccountStatus	ACCOUNT_STATUS	0 for active, 1 for disabled, 2 for expired. Disabled accounts may not login to the environment even if there is data in the environment for the account. Disabled accounts do not count toward the license key count for the institution. Expired accounts are treating the same as disabled accounts.	smallint

ANGEL Business Object	ANGEL Database Field (Accounts Table)	Description	Data Type (Size)
AccountType	ACCOUNT_TYPE	The authentication type for this account. Can be 0 for external authentication (Domain or POP3) or 1 for ANGEL authentication.	smallint
Attributes	ATTRIBUTES	Reserved for future use.	ntext
Email	EMAIL	The email address to be used for primary contact	nvarchar(100)
FirstName	FIRST_NAME	The first name as it should appear in the environment.	nvarchar(50)
HintAnswer	HINT_ANSWER	Reserved for future use.	nvarchar(50)
HintPrompt	HINT_PROMPT	Reserved for future use.	nvarchar(200)
LastName	LAST_NAME	The last name as it should appear in the environment.	nvarchar(50)
Password	PASSWORD	Password for this user if ANGEL authentication is being used. If Domain or POP3 authentication is used, the password is not stored in the database.	nvarchar(100)
PwdChanged	PWD_CHANGED	Reserved for future use.	datetime
PwdForceChange	PWD_FORCE_CHANGE	Indicates if a user will be required to change an accounts password (when ANGEL authentication is used). A value of 1 means that the password must be changed upon next login attempt.	smallint
PwdNeverExpires	PWD_NEVER_EXPIRES	Indicates that an account's is not subject to password expiration settings (password expiration settings are established by use of the PASSWORD_FORCE_CHANGE or PASSWORD_LIFE environment variables).	smallint
SkipIntro	SKIP_INTRO		smallint

Courses

ANGEL Business Object	ANGEL Database Field (Courses Table)	Description	Data Type (Size)
CourseId	COURSE_ID	A unique identifier for this course. In most cases, the COURSE_ID is unique per course, per session it is offered, for each section or instance of the course that is offered.	nvarchar(100)
SourceId	SourceId	The unique identifier for each course in the system. This field is stored in this table for the purposes of synchronizing this account with other systems. It is not viewable or passed through the environment.	nvarchar(100)
CourseType	COURSE_TYPE	This field determines if this should be displayed as a course or group in ANGEL. Possible values are "COURSE" or "GROUP". If identified as a "GROUP", this section will use language that is not specific to an education environment. For example, instead of a course roster, it will have a member list, and instead of a lessons page, it will have a content section.	nvarchar(25)
CourseField	COURSE	Unique identifier for this course curriculum (Example: Biology 101)	nvarchar(50)
Section	SECTION	Unique identifier for this instance of the course (Example: A32324)	nvarchar(8)
BillingId	BILLING_ID	Used with XEI Intialize courses customizaion	nvarchar(100)
Campus	CAMPUS	Campus on which this course is offered	nvarchar(4)
Category	CATEGORY	This field determines when the course should appear on the user's profile page. It is assumed that the category identifies a semester and year, for example "Nonstandard Schedule" or "Spring 2002"	nvarchar(50)

ANGEL Business Object	ANGEL Database Field (Courses Table)	Description	Data Type (Size)
ClassBegins	CLASS_BEGINS	Date to begin showing this course on the “My Profile” page for each student.	datetime
ClassEnds	CLASS_ENDS	Date to end user access to this course from the “My Profile” page for each student.	datetime
Contact1	CONTACT1	Primary contact information for persons interested in further information for this course.	nvarchar(255)
Contact2	CONTACT2	Secondary contact information for persons interested in further information for this course.	nvarchar(255)
Cost	COST	Cost of this course. Not currently utilized by the ANGEL software.	float
CourseTime	COURSE_TIME		datetime
CourseUploadUrl	COURSE_UPLOAD_URL		nvarchar(255)
Credits	CREDITS	Credit value of this course. Not currently utilized by the ANGEL software.	int
Department	DEPARTMENT	Department for this course	nvarchar(6)
Description	DESCRIPTION	The description to display as a course synopsis when this course is viewed from the public search engine.	ntext
Disabled	DISABLED	A value of 1 in this field will remove course access from all but editors of the course. Students will no longer be able to access the course.	smallint
Duration	DURATION		int
EnrollmentBegins	ENROLLMENT_BEGINS	Date on which users may self-enroll in this course.	datetime

ANGEL Business Object	ANGEL Database Field (Courses Table)	Description	Data Type (Size)
EnrollmentEnds	ENROLLMENT_ENDS	Date on which self enrollment ends for this course.	datetime
EnrollmentMethod	ENROLLMENT_METHOD	Deprecated.	int
EnrollmentPin	ENROLLMENT_PIN	PIN number to be used to allow users to self enroll. If not specified, users who search for the course using the public course search utility will be allowed to enroll themselves automatically in the course.	nvarchar(50)
Hidden	HIDDEN	A value of 1 in this field will hide this course from the public course search engine. The course will appear on the "My Profile" page for users enrolled in the course.	smallint
Instructor	INSTRUCTOR	The name of the instructor of record for this course. Displayed during course search.	nvarchar(100)
InstructorId	INSTRUCTOR_ID	The USER_ID for the instructor of record for this course. Maps to USERNAME in the ACCOUNTS table.	nvarchar(100)
Keywords	KEYWORDS	Comma-separated keyword list to be used by the course search engine	nvarchar(255)
Locked	LOCKED	This field is not used by the ANGEL software, but is intended to be used when synchronizing courses with an outside database. A course entry with a locked value of "1" should not be touched when doing drops/adds/updates.	smallint
RedirectTarget	REDIRECT_TARGET	The location in the web browser to open the REDIRECT_URL, if specified. Can specify the predefined HTML values of "_blank", "_parent", "_self", or "_top", or the name of a frame or browser.	nvarchar(50)

ANGEL Business Object	ANGEL Database Field (Courses Table)	Description	Data Type (Size)
RedirectUrl	REDIRECT_URL	This optional field may be used to specify an alternate URL or course management system to use for this course. If specified, the user's web browser will be redirected to REDIRECT_URL for this course instead of entering the course through the ANGEL course management system.	nvarchar(255)
ScheduleDays	SCHEDULE_DAYS		int
ScheduleInterval	SCHEDULE_INTERVAL		int
ScheduleOccurrence	SCHEDULE_OCCURRENCE		int
ScheduleType	SCHEDULE_TYPE		int
School	SCHOOL	School offering this course	nvarchar(6)
Semester	SEMESTER	Semester code for which this course is offered. Must be unique for each unique semester, including a year code. (Example: FALL2002)	nvarchar(12)
Stylesheet	STYLESHEET	The URL for the style sheet to use for this course. ANGEL style sheets are located in the /Stylesheets/ directory under the ANGEL virtual root, and can be created and edited using the "Course Theme Selector" utility on each course "Tools" page. Default value is usually programmatically assigned to /Angel/Stylesheets/default.css	nvarchar(255)
Title	TITLE	The title of this course	nvarchar(255)
ViewableBy	VIEWABLE_BY	The rights level needed to view this course when it is searched for using the public search engine. Possible values are: 64 for administrators, 1 for authenticated users, and 0 for public.	smallint

Course Roster

ANGEL Field	ANGEL Database Field (Course_roster Table)	Description	Data Type (Size)
CourseId	COURSE_ID	The COURSE_ID for this enrollment entry. MAPS to COURSE_ID in the COURSES table.	nvarchar(100)
CourseSourceId		The unique identifier for each enrollment in the system. This field is stored in this table for the purposes of synchronizing this account with other systems. It is not viewable or passed through the environment.	nvarchar(100)
UserId	USER_ID	The USER_ID for this enrollment entry. Maps to USERNAME in the ACCOUNTS table.	nvarchar(100)
UserSourceId	ID		uniqueidentifier
UserRights	USER_RIGHTS	The user's rights within this course. Possible values are: 1=Guests 2=Students 4=Team Leaders 8=Course Mentors 16=Course Assistants 32=Course Editors 64=Course Administrators	int
BillingId	BILLING_ID	The billing id for this course enrollment entry, as determined by the institution. Default is NULL.	nvarchar(100)
Disabled	DISABLED	Possible values are 1 = Disabled. 0 = not disabled. Disabled courses will not appear on the user's profile page. This value can be used to disable a disruptive student or deny access at the end of a term.	int

ANGEL Field	ANGEL Database Field (Course_roster Table)	Description	Data Type (Size)
EndDate	END_DATE		datetime
Hidden	HIDDEN	0 = Display an entry for this user on the Class or Members tab for this course. 1 = Do not display an entry.	int
Locked	LOCKED	This field is not used by the ANGEL software, but is intended to be used when synchronizing roster entries with an outside database. A course roster entry with a locked value of "1" should not be touched when doing drops/adds/updates.	smallint
StartDate	START_DATE		datetime
Status	STATUS	Not used by the ANGEL software. Intended for use by institution-defined codes for the enrollment status for this user. For example, this field may contain a numeric value indicating the user has requested the course but it has not been approved, etc. Default value is 0.	smallint
UserGroup	USER_GROUP	The team this user is a member of. Used for access control for lesson content, default team names are created for each USER_ROLE with an entry on the course roster. The course editor may also create additional teams as needed for access control.	nvarchar(100)
UserRole	USER_ROLE	The title for this user, as displayed on the course roster or member list. For display only, not utilized programmatically for access control.	nvarchar(50)

Person

ANGEL Field	ANGEL Database Field (People Table)	Description	Data Type (Size)
Userld	USER_ID	Unique identifier for this user. Maps to USERNAME in ACCOUNTS table.	nvarchar(100)
AccountSourceId	accounts.SourceId		nvarchar(100)
Adr1City	ADR1_CITY	Primary mailing address - City	nvarchar(100)
Adr1Country	ADR1_COUNTRY	Primary mailing address - Country	nvarchar(50)
Adr1Line1	ADR1_LINE1	Primary mailing address - Line 1	nvarchar(100)
Adr1Line2	ADR1_LINE2	Primary mailing address - Line 2	nvarchar(100)
Adr1Line3	ADR1_LINE3	Primary mailing address - Line 3	nvarchar(100)
Adr1Pobox	ADR1_POBOX	Primary mailing address - P.O. Box	nvarchar(25)
Adr1PostalCode	ADR1_POSTAL_CODE	Primary mailing address - Postal Code	nvarchar(25)
Adr1Security	ADR1_SECURITY	Account rights necessary to view this user's address information for this address entry.	int
Adr1State	ADR1_STATE	Primary mailing address - State/Providence	nvarchar(100)
Adr1Type	ADR1_TYPE		nvarchar(10)
Adr2City	ADR2_CITY	Secondary mailing address - City	nvarchar(100)

ANGEL Field	ANGEL Database Field (People Table)	Description	Data Type (Size)
Adr2Country	ADR2_COUNTRY	Secondary mailing address - Country	nvarchar(50)
Adr2Line1	ADR2_LINE1	Secondary mailing address - Line 1	nvarchar(100)
Adr2Line2	ADR2_LINE2	Secondary mailing address - Line 2	nvarchar(100)
Adr2Line3	ADR2_LINE3	Secondary mailing address - Line 3	nvarchar(100)
Adr2Pobox	ADR2_POBOX	Secondary mailing address - P.O. Box	nvarchar(25)
Adr2PostalCode	ADR2_POSTAL_CODE	Secondary mailing address - Postal Code	nvarchar(25)
Adr2Security	ADR2_SECURITY	Account rights necessary to view this user's address information for this address entry.	int
Adr2State	ADR2_STATE	Secondary mailing address - State/Providence	nvarchar(100)
Adr2Type	ADR2_TYPE		nvarchar(10)
Department	DEPARTMENT	The name of the department in the organization	nvarchar(100)
Division	DIVISION	The name of the division in the organization	nvarchar(100)
Email	EMAIL	The email address to be used for primary contact	nvarchar(255)
EmailSecurity	EMAIL_SECURITY	Account rights necessary to view this user's email address information.	smallint
Fname	FNAME	The first name as it should appear in the environment.	nvarchar(50)

ANGEL Field	ANGEL Database Field (People Table)	Description	Data Type (Size)
GeoSecurity	GEO_SECURITY	Account rights necessary to view this user's longitude, latitude, and UTC Timezone.	int
Homepage	HOMEPAGE	The URL of homepage if any	nvarchar(255)
Lattitude	LATTITUDE		nvarchar(15)
Lname	LNAME	The last name as it should appear in the environment	nvarchar(50)
Logo	LOGO	The URL of the organization's logo	nvarchar(255)
Longitude	LONGITUDE		nvarchar(15)
Mname	MNAME	The middle name as it should appear in the environment	nvarchar(50)
Nickname	NICKNAME	The nickname if any	nvarchar(50)
Organization	ORG_SECURITY	Account rights necessary to view this user's organization information.	smallint
OrgSecurity	ORGANIZATION	The name of the organization	nvarchar(100)
Photo	PHOTO	The URL of a photo	nvarchar(255)
PhotoSecurity	PHOTO_SECURITY	Account rights necessary to view this user's photo URL information.	smallint
Prefix	PREFIX	The title prefix that should to appear before the name.	nvarchar(10)
Role	ROLE	The role or profession within the organization	nvarchar(100)
Security	SECURITY	String to use when sorting this user's name in user lists	smallint

ANGEL Field	ANGEL Database Field (People Table)	Description	Data Type (Size)
Sortstring	SORTSTRING		nvarchar(50)
Soundex	SOUNDEX	Deprecated	nvarchar(5)
Ssn	SSN	The users Social Security Number	nvarchar(25)
Suffix	SUFFIX	The honor suffix that should appear after the name	nvarchar(10)
Tel1	TEL1	The Phone number to be used for primary contact	nvarchar(25)
Tel1Security	TEL1_SECURITY	Account rights necessary to view this user's telephone information for this phone entry.	int
Tel1Type	TEL1_TYPE		nvarchar(10)
Tel2	TEL2	Second available telephone number	nvarchar(25)
Tel2Security	TEL2_SECURITY	Account rights necessary to view this user's telephone information for this phone entry.	int
Tel2Type	TEL2_TYPE		nvarchar(10)
Tel3	TEL3	Third available telephone number	nvarchar(25)

Appendix C: XEI Database Tables



Further information and field-level information about these tables can be found in the 7.3 ANGEL Database Reference document.

Table	Description
EIFBroker	An EIFBroker record identifies the .NET Type that implements the IMessageBroker interface.
EIFDataProcessor	An EIFDataProcessor record defines a .NET Type that implements the IDataProcessor interface.
EIFFunction	An EIFFunction record defines each of the field mappings available by default in the drop-down list on the mapping screen.
EIFImplementationAdapter	An EIFImplementationAdapter record defines a .NET Type that implements the ImplementationAdapter interface.
EIFIntegration	An EIFIntegration record defines a single EIF integration job.
EIFIntegrationLog	An EIFIntegrationLog record contains the logged information from a single run of the associated EIF integration job.
EIFIntegrationLogMessage	An EIFIntegrationLogMessage record contains a single log message from a run of the associated EIF integration job. Many messages may be logged during a single run of the associated EIF integration job.
EIFIntegrationObject	An EIFIntegrationObject record identifies an ANGEL business object that can participate in the EIF data mapping process. For an EIFIntegrationObject record to be useful, associated EIFIntegrationProperty records must also be created.
EIFIntegrationProperty	An EIFIntegrationProperty record identified a single property on the associated EIFIntegrationObject for use in the EIF data mapping process. Properties that participate in the EIF data mapping process must be identified in this table.
EIFSourceDataSpecification	An EIFSourceDataSpefication record identifies the known data format specification. Known specifications are used to define default mapping rules.

Appendix D: Troubleshooting Guide

Frequently Asked Questions

Are there security considerations when using XEI on an ANGEL-hosted site (AHS)?

See the security section of each Method of Integration for further information.

Why do users not have access to a course that has been imported?

This will occur if the course membership has not also been imported for a course. If not performed, then users will not have appropriate membership privileges to access the course.

Why does the instructor not have access to their newly imported course?

Users are given specific rights to the courses in which they have membership. The typical student User_Rights field is set to '2'. In the Table Mappings process of creating the XEI Mapping the DefaultValue for User_Rights may have been set to '2'. This can be corrected by changing the User_Rights for that instructor.

I created the agent, but why is it is not running?

A common problem is to have accidentally set the jobs start time for a date in the past. This can easily happen if perhaps the year or month fields have been left alone.

Also, ensure that the ANGEL Agent Manager is running. One way to confirm that the service is running is by confirming that the service is running in MS Services console.

What tables are used with XEI imports?

XEI transformations only add data to the following ANGEL tables

1. Accounts
2. People
3. Courses
4. Course_Roster

Do I have to re-enter the entire Table Mapping information every time I create a new mapping?

This can be done using the Copy Agent function in the XEI System Agent Manager.

Validation Error Messages

Step 2: Configure ODBC Agent, Number 6

Error	Display Text
Invalid Format	The connection string is improperly formatted. Error: [error returned from connection string validation.

Error	Display Text
Source Not Found	Unable to connect to the data source. Please validate that the connection string is correct and ensure that the ANGEL server has an open connection to the database. Error: [Error that is returned when the system attempts to reach the data store.]
Invalid Query	The query provided is invalid. Error: [Error that is returned when the system attempts to query the remote data store.]
Invalid Directory	Archive directory does not exist or cannot be found.
Invalid Permissions	Agents Service does not have read/write/delete access to the archive directory.

Step 2: Configure File System Agent, Number 6

Error	Display Text
Invalid Directory	Directory does not exist or cannot be found.
Invalid Permissions	Agents Service does not have read/write/delete access to the archive directory.
Source Already Exists	This source has already been added. You cannot have more than one agent per data source.

Step 2: Configure Message Broker Agent, Number 6

Error	Display Text
Invalid Format	The URL or IP Address that you have entered is not properly formatted.
Source Not Found	Unable to connect to address [address]. Please validate that the address is correct and ensure that the ANGEL server has an open connection to this address. Error: [Error that is returned when we try to reach the address].
Source Already Exists	This source has already been added. You cannot have more than one agent per data source.
Invalid Directory	Directory does not exist or cannot be found.
Invalid Permissions	Agents Service does not have read/write/delete access to the archive directory.

Appendix E: Advanced Configuration

XEI Environment Variables

These variables can be set using the Environment Variable Manager on the Administration Console. All variables are either required or have a default setting if not defined.

Environment Variable	R/O	Description
XEI_BASE_PATH	R	<p>Specifies the file system path for the root XEI folder. If this environment variable does not exist, an exception will be thrown. Example: \\server\angel\xei</p> <p> Altering this variable after jobs are already created and running will cause the jobs to fail. If this variable is changed, every agent configured prior to the change will need to have the XEI_BASE_PATH updated manually.</p>
XEI_FORCE_PREVIEW_MODE	O	<p>Instructs XEI to run all integrations in preview mode. Possible values are:</p> <ul style="list-style-type: none"> • 0: Not enabled • 1: Enabled <p>Default value is 0 if not specified.</p> <p> When enabled, any executed agents will run through all of the data inserts/updates, but the system will roll back each transaction in the database. This functionality is very useful in testing agents for database errors in a manner that does not actually change the data in ANGEL.</p>
XEI_DEFAULT_LOG_MODE	O	<p>Specifies the default log level for new XEI jobs. Possible values are:</p> <ul style="list-style-type: none"> • Error • Warning • Informational • Verbose <p>Default value is <i>Informational</i> if not specified.</p>

Environment Variable	R/O	Description
XEI_MINIMUM_LOG_MODE	O	<p>Specifies the minimum log level. All jobs will be forced to run using at least the specified log level. Possible values include:</p> <ul style="list-style-type: none">• Error• Warning• Informational• Verbose <p>Default value is Error if not specified.</p>
XEI_SHOW_ALL_TRANSACTION_MESSAGES	O	<p>Determines if the transaction details page displays all messages, or just error messages. Possible values include:</p> <ul style="list-style-type: none">• 0: Only error messages are displayed• 1: All messages are displayed <p>Default value is 0 if not specified.</p>

Appendix F: Connection Strings

A connection string is a string version of the initialization properties needed to connect to a database and enables you to easily store connection information or to pass it between applications. Without a connection string, you would be required to store or pass a complex array of structures to access data.

There are two types of connection string that can be used. They are:

- **ODBC** - Short for Open DataBase Connectivity, a standard database access technology developed by Microsoft Corporation. The purpose of ODBC is to allow accessing any DBMS (DataBase Management System) from any application (as long as the application and the database are ODBC compliant), regardless of which DBMS is managing the data. ODBC achieves this by using a middle layer, called a database driver, between an application and the DBMS. The purpose of this layer is to transform the application's data queries into commands that the DBMS understands.
- **OLE DB** - Short for Object Linking and Embedding Data Base. OLE DB is a set of COM-based interfaces that expose data from a range of sources. OLE DB interfaces give applications standardized access to data stored in various information sources like Relational Database Management Systems (MS SQL Server, Oracle, MySQL), small personal databases like MS Access, productivity tools like spreadsheets; plain text files, etc. These interfaces support the amount of DBMS functionality appropriate to the data store, allowing the data store to share its data.

The following are sample connection strings typically used with XEI. Other samples are available at www.connectionstrings.com.

Database	Connection	Connection String
SQL Server	ODBC	Driver={SQLServer}; Server=Your_Server_Name; Database=Your_Database_Name; Uid=Your_Username; Pwd=Your_Password;"
	OLE DB	Provider=SQLOLEDB; Data Source=Your_Server_Name; Initial Catalog=Your_Database_Name; UserId=Your_Username; Password=Your_Password;
Oracle	ODBC	Driver={Microsoft ODBC for Oracle}; Server=Your_Oracle_Server.world; Uid=Your_Username; Pwd=Your_Password
	OLE DB	Provider=MSDAORA; Data Source=Your_Oracle_Database; UserId=Your_Username; Password=Your_Password;" Note: Using the Microsoft provider

Database	Connection	Connection String
		Provider=OraOLEDB.Oracle; Data Source=Your_Oracle_Database; UserId=Your_Username; Password=Your_Password; Note: Using the Oracle provider
MS Access	ODBC	Driver={Microsoft Access Driver(*.mdb)}; DBQ=C:\App1\Your_Database_Name.mdb; Uid=Your_Username; Pwd=Your_Password;
	OLE DB	Provider=Microsoft.Jet.OLEDB.4.0; Data Source=c:\App1\Your_Database_Name.mdb; User Id=admin; Password=