Improving Productivity with Enterprise Search for Microsoft Dynamics AX 2012

WHITEPAPER
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Introduction
This whitepaper reviews the enterprise search feature in Microsoft Dynamics® AX 2012.

Enterprise Search in Microsoft Dynamics AX 2012 enables users to search through data, metadata, and documents that are attached to records by using either the Microsoft Dynamics AX client or Enterprise Portal for Microsoft Dynamics AX. Users can search for common nouns, such as 'customer' and 'cash flow report.' Users can also search for specific data, such as a customer name, product ID, or telephone number. The search box is prominently displayed in the Microsoft Dynamics AX client, and users can view recent search terms in a list.

Scenario

Claire, the Accounts Payable Clerk, is entering invoices when her phone rings. She thinks to herself, “I cannot get anything done. Every time I start to make progress, I get interrupted.” She politely answers the phone and assists a vendor who wants to know if a particular invoice has been paid.

In earlier releases of Microsoft Dynamics AX, Claire must click about 15-20 times to find the vendor account, then locate the invoice, and finally find the check number that paid the check. Then the vendor requests to have a copy of the check faxed over. This means that she will have to pull a copy of the check from the file cabinets and fax it. At this point Claire has spent 15 minutes helping one vendor with what you might think is a very simple task. When she is finished she goes back to entering invoice and the process repeats, all day long.

What if I told you that you can find the check number for an invoice in about 5 clicks and you can complete the same task in 5 minutes or less using Microsoft Dynamics AX 2012? I am sure that you can imagine that many people in your company have a similar problem: getting interrupted frequently and spending more time that what seems necessary to solve a simple problem.
Planning
Planning for Enterprise Search involves a process of deciding which pieces of data and metadata should be searchable, and therefore indexed for quick searches. Many different techniques can be used for determining which pieces of data should be searchable. We recommend asking your users what are the top three to five things that they search for. You can also use the following list as a guide to areas that you might want to index.

When deciding which data and metadata should be searchable, consider the size of the table, the frequency the data will be searched for, and the number of users that will search for the same data. Use the following list as a guide for possible data to setup in Enterprise Search.

<table>
<thead>
<tr>
<th>Area</th>
<th>Data</th>
<th>Freq.</th>
<th>Size</th>
<th>Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts Payable</td>
<td>Vendor numbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Payable</td>
<td>Vendor invoice numbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Payable</td>
<td>Purchase order numbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Payable</td>
<td>Reference Numbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>Customer numbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>Customer invoice numbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>Customer name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>Invoice amount</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>Payment reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>Sales order number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>Customer number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>RMA number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>Tracking number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchasing</td>
<td>Purchase order number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchasing</td>
<td>Reference number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchasing</td>
<td>Item number or category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>Main account number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>Fixed asset number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>Journal number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>Production order number</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Production</td>
<td>Bill of material</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Production</td>
<td>Product or item number</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Production</td>
<td>Route or operation number</td>
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<tr>
<td>Inventory</td>
<td>Product or item number</td>
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<tr>
<td>Inventory</td>
<td>Warehouse or locations</td>
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<tr>
<td>Inventory</td>
<td>Serial or batch number</td>
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<td></td>
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<tr>
<td>Inventory</td>
<td>Transfer order number</td>
<td></td>
<td></td>
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<tr>
<td>Quality Management</td>
<td>Quality order number</td>
<td></td>
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<tr>
<td>Quality Management</td>
<td>Quarantine order number</td>
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<tr>
<td>Quality Management</td>
<td>Hold code</td>
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<td></td>
</tr>
<tr>
<td>Quality Management</td>
<td>Product or item number</td>
<td></td>
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</table>
Review this list with your end-users and technical staff to make decisions about what data and metadata should be searchable. The list provided is not a comprehensive list of data that is searchable, rather a starting point for the discussion.

When considering each piece of data to be queried and indexed, consider which form you want to open when that data is found.

When a main account is entered into the search, you might want to find the actual Main accounts form, or you might want to open the Budget register entry from for the selected main account. If both are wanted, then you must create two different queries with different form references.

When more data and metadata is indexed, the search results will return slower. This is also based on other factors such as hardware. When deciding how much to index, you should consider the hardware and network resources that are available to complete the search.
Security
This topic describes how Microsoft Dynamics AX restricts access to data, metadata, and documents in Enterprise Search results. If Search is installed by using Setup, users can search in the Microsoft Dynamics AX client or Enterprise Portal. After you install Search, the search box is available in the Microsoft Dynamics AX client. The data that is returned by Search is determined by queries that are listed in the Application Object Tree (AOT) and design features that trim data in Search results.

Note: In this topic, Search results that include data, metadata, and documents are referred to as data.

Application Object Tree Queries
Data, metadata, and documents can only be crawled and indexed for search if the database table is included in a Microsoft Dynamics AX AOT query. After the table is specified in a query, the query must be configured for Search. You configure a query for Search by setting the Searchable property to True in the AOT. By default, only the following queries are configured for Search. The following queries are automatically published and indexed after you install Enterprise Search:

- BdcDocuRef
- CustTableListPage
- EcoResProductPerCompanySearch
- HcmWorkerListPage
- SecurityRoleAllTasks
- smmBusinessRelations_NoFilter
- VendorEnterpriseSearch

After you install Enterprise Search, you specify which data and metadata should be indexed for search by configuring Microsoft Dynamics AX queries. Specifically, in the Queries node of the Application Object Tree (AOT), you set the Searchable property to True for those queries that should be indexed for search. After you specify a query as searchable, you must check the best practices on the query to ensure it can be published to the Microsoft SharePoint Business Data Connectivity Service (BCS). Administrators must work closely with business decision makers to identify queries that should be searchable.
Design features that trim data in Search results

The following design features of Microsoft Dynamics AX Enterprise Search help trim data in Search results.

**Role-based security**

Microsoft Dynamics AX restricts the data that is returned in Search results, based on each user’s role in Microsoft Dynamics AX. Role-based security trims data at the level of database tables, records, and fields.

- **Tables**: When a user performs a search, Microsoft Dynamics AX verifies that members of the user’s role can view the tables that are listed in the AOT query. If the role does not have permission to view data from a table, Search trims the results. For example, an AOT query includes Table 1 and Table 2, but a user’s role only has permission to view data from Table 1. In this case, Search returns data from Table 1 but trims all data from Table 2.

- **Records**: When a user performs a search, Microsoft Dynamics AX verifies that members of the user’s role can view the records that are contained in the tables in the AOT query. If the role does not have permission to view one or more records in a table, Search trims the results. For example, an AOT query includes Table 1, a user’s role has permission to view data from Table 1, but Table 1 has a record that the user’s role is not permitted to view. In this case, Search returns data from Table 1 but trims the data for the restricted record.

- **Variable field access**: Microsoft Dynamics AX excludes a field from Search results if the field has different access permissions for different roles. For example, a record includes a field that is named **Employee Performance Score**. Role 1 can view the field, but Role 2 cannot view the field. In this case, the data in the field is excluded from all Search results. Therefore, **Employee Performance Score** is not displayed in the Search results, regardless of the user who performed the search, because the field is not indexed by Search. Fields that have variable access are not indexed and are therefore not discoverable in Search.

**Form references**

Tables in the AOT include a **FormRef** property. This property specifies the form that is used in the Microsoft Dynamics AX client to enter data for a specific table. Tables also include a **SearchLinkRefName** property. This property specifies the form that is used in Enterprise Portal to enter data for a specific table. If either of these properties is empty, Search excludes results for form metadata for the corresponding client, the Microsoft Dynamics AX client or Enterprise Portal. For example, an AOT query includes Table 1, and the **FormRef** property is empty for Table 1. In this case, Search results do not include metadata links to the form.
Installation

All aspects of crawling, indexing, and retrieving Microsoft Dynamics AX data and metadata for search are performed by one of the following products:

- Microsoft SharePoint Server 2010
- Microsoft Search Server 2010
- Microsoft Search Server Express 2010, a free download
- Microsoft FAST Search Server 2010

One of these products must be available in the computing environment before you can install Enterprise Search. We recommend that you use SharePoint Server 2010 if your business or organization intends to deploy Enterprise Portal. Of all the products listed here, SharePoint Server 2010 is the only product that hosts Enterprise Portal and Enterprise Search.

Successful implementation of Enterprise Search for Microsoft Dynamics AX 2012 requires planning. The topics in this section explain the Enterprise Search architecture and help you plan the system topology.

The Search Service

Setup installs the Microsoft Dynamics AX Enterprise Search service on the web server. The Microsoft Dynamics AX Enterprise Search service is a .NET DLL that enables Microsoft Dynamics AX clients and Enterprise Portal to communicate with SharePoint by using web services. The Microsoft Dynamics AX Enterprise Search service also enables communication between SharePoint and Application Object Server (AOS) services for crawling, indexing, and retrieving data from the Microsoft Dynamics AX database.

Enterprise Search Architecture

The following diagram provides a high-level overview of the Microsoft Dynamics AX Enterprise Search architecture.
Microsoft Dynamics AX Enterprise Search Architecture

Microsoft Dynamics AX client or Enterprise Portal

Microsoft Dynamics AX search service
- Enterprise Portal Search Framework
- SharePoint Business Data Connectivity Service (BCS)
- SharePoint Service Application

Microsoft SharePoint Server 2010
- or: Microsoft Search Server 2010
- or: Microsoft Search Server Express 2010
- or: Microsoft FAST Search Server 2010

Internet Information Services (IIS) web server that hosts Enterprise Search

Microsoft Dynamics AX Application
- Object Server (AOS) services
- Microsoft Dynamics AOS

Microsoft Dynamics AX model store

Microsoft SQL Server

Microsoft Dynamics AX Enterprise Search Architecture
Installation and Configuration Overview

This section provides a high level overview of how an administrator installs and configures Microsoft Dynamics AX Enterprise Search.

Checklist: Deploy Enterprise Search

- Install the Microsoft Dynamics AX client, database, and Application Object Server.
- Configure the domain account that is used to crawl search.
- Configure logging to conserve disk space.
- Specify which queries are crawled and indexed for search.
- Deploy Search in the environment by using Setup
- Publish searchable queries to the Business Data Connectivity (BDS) service.
- Verify that Search is installed and data is discoverable in Search results.

Configure the Search Crawler Account

This topic describes how to configure the Enterprise Search crawler account so that the Microsoft SharePoint indexing service can crawl Microsoft Dynamics AX data for Enterprise Search. Before you can configure the account, you must create a domain account for the search crawler. For more information, refer to the Create service accounts page on TechNet.

1. Add the domain account as a user in Microsoft Dynamics AX. For more information, refer to the Create new users page on TechNet.
2. Assign the user to the Search crawler role in Microsoft Dynamics AX. For more information, refer to the Assign users to security roles page on TechNet.
Configure SharePoint Services Logging

By default, there is no limit on the disk space that diagnostic logging for Microsoft SharePoint 2010 products can use. If you do not specify a limit, diagnostic logging can use all of the space on the hard disk of the Enterprise Search server.

To specify limits for diagnostic logging for SharePoint 2010 products, follow these steps.

1. In SharePoint 2010 Central Administration, click Monitoring.
2. Under Reporting, click Configure diagnostic logging.

3. In the Number of days to store log files section, enter a number.
4. Select the Restrict Trace Log disk space usage option.
5. In the Maximum storage space for Trace Logs (GB) field, enter a number.
6. Click OK.
7. Under Reporting, click Configure usage and health data collection.
8. In the Maximum log file size field, enter a number.
9. Click OK.
Install Enterprise Search

Microsoft Dynamics AX Enterprise Search is installed by using Setup. Setup installs the Microsoft Dynamics AX Search Service, which enables Microsoft Dynamics AX clients and Enterprise Portal to communicate with the SharePoint Search service. Setup also configures the Business Connector proxy account and the Enterprise Search account. After Setup finishes installing Search, the system publishes the out-of-box searchable queries and starts the full data and metadata crawl.

This topic describes how to install Microsoft Dynamics AX Enterprise Search. You install and deploy the files that are required to run searches for Microsoft Dynamics AX clients and Enterprise Portal for Microsoft Dynamics AX. You must complete the installation procedure on each search server.

Before you Install Enterprise Search

- Install the Microsoft Dynamics AX client, database, and Application Object Server (AOS) in the environment before you install Enterprise Search.
- Create a domain account for Enterprise Search.
- Verify that the SharePoint Web application used for Microsoft Dynamics AX Enterprise Search is configured for NTLM authentication.
- Verify that the Web application is not configured for anonymous authentication.
- Run the prerequisite validation utility to verify that system requirements have been met.
- If you are setting up Enterprise Search in a SharePoint server farm, verify that the Business Data Connectivity service (BDC) is only running on the Enterprise Search server. You must stop this service an all Web front-end servers in the farm. If you do not stop the service on all Web front-end servers, Enterprise Search fails to install.
Procedure: Install Enterprise Search

Use this procedure to install Enterprise Search. If you are installing other Microsoft Dynamics AX components at the same time, the installation pages vary, based on the components that you are installing.

1. Start Microsoft Dynamics AX Setup. Under Install, select **Microsoft Dynamics AX components**. Advance through the first wizard pages.
2. If the Setup Support files have not yet been installed on the computer, the **Select a file location** page is displayed. The Setup Support files are required for installation. Enter a file location or accept the default location, and then click **Next**. On the **Ready to install** page, click **Install**.
3. On the **Select installation type** page, click **Custom installation**, and then click **Next**.
4. On the **Select components** page, select **Enterprise Search**, and then click **Next**.

![Prerequisite validation utility]

5. On the **Prerequisite validation results** page, resolve any errors. For more information about how to resolve prerequisite errors, refer to the Check **prerequisites** page on TechNet. When no errors remain, click **Next**.
6. On the **Select a file location** page, select the location where you want to install 32-bit versions of Microsoft Dynamics AX files, and then click **Next**.

7. On the **Specify a location for configuration settings** page, specify whether you want Enterprise Search to access configuration information from the registry on the local computer or from a shared configuration file. If you select to use a shared configuration file, you must enter the network location of the file. Click **Next**.

8. On the **Connect to an AOS instance** page, enter the name of the computer that is running the Application Object Server (AOS) instance that you want to connect to. You can optionally specify the name of the AOS instance, the TCP/IP port number, and the WSDL port for services. Click **Next**.

   ![Note]
   
   *If you entered AOS connection information for other Microsoft Dynamics AX components that are installed on this computer, this screen is not displayed. Subsequent installations on this computer reuse the existing AOS connection.*

9. On the **Specify Business Connector proxy account information** page, enter the password for the proxy account that is used by the .NET Business Connector. Click **Next**.

10. On the **Specify the search crawler account** page, enter the account information, and then click **Next**.

11. On the **Prerequisite validation results** page, resolve any errors. When no errors remain, click **Next**.

12. On the **Ready to install** page, click **Install**.

13. After the installation is complete, click **Finish** to close the wizard.
Procedure: Post-install Configuration

If you installed Enterprise Search on a computer separate from the AOS, you must specify the Search server url in the Enterprise Portal parameters form. If you do not specify the URL, Search does not retrieve data.


![Enterprise Portal Parameters Form]

2. Click Search.
3. In the Search server url field, enter the URL to the SharePoint Search service where you just installed Search. Replace server_name with the name of the server where you installed Search: http://server_name/sites/DynamicsAXClientSearch/_vti_bin/search.asmx
4. Click Close to save changes.
Procedure: Post-install Validation

Use SharePoint Central Administration to verify that the crawl for these queries has finished running.

1. Click **Start**, open **SharePoint 2010 Products**, and then click **SharePoint 2010 Central Administration**.
2. In SharePoint Central Administration, click **Manage service applications** and then click **Search Service Application**.
3. Click **Content Sources** on the Navigation Pane; verify that **Microsoft Dynamics AX** and **Microsoft Dynamics AX Metadata** show a crawl end time and no errors.
Configuration

Specify Searchable Data and Metadata

After you install Enterprise Search, you specify which data and metadata should be indexed for search by configuring Microsoft Dynamics AX queries. Specifically, in the Queries node of the Application Object Tree (AOT), you set the Searchable property to True for those queries that should be indexed for search. After you specify a query as searchable, you must check the best practices on the query to ensure it can be published to the Microsoft SharePoint Business Data Connectivity Service (BCS). Administrators must work closely with business decision makers to identify queries that should be searchable.

Procedure: Add AOT Queries to the Search Configuration

To add a new query to search, follow these steps.

1. Open the Development Workspace by pressing CTRL+SHIFT+W.
2. In the AOT, expand the Queries node.
3. Select the VendInvoice query from the list.
4. Right-click the VendInvoice query, and then select Properties.
5. In the Properties window, set the Searchable property to Yes.
6. In the AOT window, right-click the **VendInvoice** query and select **Add-ins > Check Best Practices**.
   - Verify that there are no best practice check errors. If there are errors, the query might not be configurable for Enterprise Search. Review the errors to learn more.

7. In the AOT window, click **Save all** or press **CTRL+SHIFT+S**.

8. In the Development Workspace, click **Tools > Caches > Refresh elements**.
   - After you have configured a query for Enterprise Search, you may need to update the caches so that the changes are available in the Search Configuration Wizard.

9. Close the **Infolog** and the **Development Workspace** to return to the Microsoft Dynamics AX client workspace.
**Crawling and Indexing**

After the queries have been published, the SharePoint Search service runs in the context of the Enterprise Search account to crawl the Microsoft Dynamics AX database. After the crawl is completed, users can view search results depending on their role assignments in Microsoft Dynamics AX.

**Procedure: Update the Search Crawler**

When you install Enterprise Search, the domain account that is assigned the Search Crawler role in Microsoft Dynamics AX is configured to have read-only permissions for queries that are configured for Search. When you configure new queries for Search, you must reset the permissions of the Search Crawler role to read-only for all searchable entities.

1. Open **System administration > Setup > Search > Update search crawler role**.

![Update Search Crawler Role Dialog Box](image)

2. Click **OK**.
3. A dialog box will open and ask “Do you want to update the search crawler role?”, and then click **OK**

*Note:* **This process may take several minutes to complete**

4. When the process is finished a dialog box will open and say “Search crawler role has been updated.”, and then click **OK**.
Search Configuration Wizard

After queries are identified as searchable, you publish those queries to the BCS by using the Search Configuration wizard. The Search Configuration wizard includes several screens that enable administrators to select which queries to publish, and which fields should be available in search results.

The Search Configuration Wizard helps you publish Microsoft Dynamics AX queries to the Microsoft SharePoint Business Data Connectivity Service (BCS). The wizard lists the queries that passed all checks for best practices, and for which the Searchable property is set to True. You can select which queries and table fields you want to publish to the BCS. After you complete the wizard, the queries are published to the BCS, so that SharePoint can crawl the selected tables in the Microsoft Dynamics AX database. After the crawl is completed, users can view search results either in the Microsoft Dynamics AX 32-bit client or in Enterprise Portal.

Note:

You can run the Search Configuration Wizard on a server where Enterprise Search is installed from the Microsoft Dynamics AX client or by double-clicking AXSearchSetup.exe in the following directory:
%systemdrive%\Program Files\Microsoft Dynamics AX\60\SetupSupport.
Procedure: Use the Search Configuration Wizard
To use the search configuration wizard, follow these steps.

1. Open System administration > Setup > Search > Search configuration.

![Enterprise Search Configuration Wizard](image)

2. Click Next >.
3. On the Specify service applications page, review the Business Data Connectivity Service Application and Search Service Application, and then click Next >.
4. On the Select search queries page, select the Search check box next to VendInvoice.
To select the fields that can be searched, click the Select fields radio button in the VendInvoice fields available for search pane. Then click the Select... button and choose the fields that you want to search and click OK.

To allow all fields in the query to be searchable, you can use the default value All fields.

5. On the Select search queries page, select the Start a full crawl of the data source after completing this wizard check box.
6. Click Next >.
7. On the Publish page of the wizard, click Finish.

Note:

This process may take several minutes to complete

8. When the Enterprise Search Configuration is finished, a dialog box will appear. Click OK.
If one or more queries were not published to the BCS, an error message is displayed. Review the log file at the following location: %systemdrive%\ProgramData\Microsoft\Dynamics AX\Dynamics AX Setup Logs\.

After the queries are published to the BCS, you can view the list of queries and the status of the database crawl in SharePoint Central Administration.

1. Click **Start**, open **SharePoint 2010 Products**, and then click **SharePoint 2010 Central Administration**.
2. Under **Application Management**, click **Manage service applications** (under **Service Applications**), and then click **Search Service Application**.
3. In the left pane, under **Crawling**, click **Content Sources**.
4. To view the details, click either the content source for Microsoft Dynamics AX or the content source for Microsoft Dynamics AX metadata.

> **Important:**
>
> By default, SharePoint schedules incremental crawls of the Microsoft Dynamics AX database. The incremental crawl only updates records if a parent table is modified. To ensure that the crawler updates records from joined tables, you should periodically perform a full crawl of the database.
Using Enterprise Search

After the search has been configured, you can begin using the search. To complete a search box and click the Search icon. After your search is finished, the results will display in the Content Pane. You can then click the links to drill-down in the data.

Search for a Vendor Invoice

In this task you will search for vendor invoice number Inv-2-25 for Earth Televisions. Once you locate the vendor and the invoice, you should review the check number that paid this invoice.

1. In the Microsoft Dynamics AX 2012 client workspace, type "Inv-2-25 into the Search field and then press Enter.

2. The search results will display in the Content Pane. Click the link for Earth Televisions to open the Vendor list page.

3. In the Vendor details form, click Transactions in the Action Pane.
4. Select invoice INV-2-25 from the list.
Earth Televisions – Vendor Transactions Form

5. Click **Paid by checks** to view the check number(s) that paid the invoice.

![Invoice Inv-2-25 – Invoices Paid by check form](image)

6. In the **Invoices paid by check** form, you can see that invoice Inv-2-25 is paid by check number 33 in the amount of 3,803,174.00.
Microsoft Dynamics AX 2012 includes a new feature that allows you to reprint a non-negotiable copy of a check. To do this click the Checks button in the Invoices paid by checks form, and then click Print check copy in the Checks form. If the Print check copy button is disabled, you must enable the feature to reprint checks. To enable the reprint checks feature, open Cash and bank management > Setup > Cash and bank management parameters. On the Cash and bank management parameters form, select the Allow copies of payments check box.