Analytics

Student Analytics Technical Guide

25.0.0

January 2025

Anthology Inc.

Revision History

Rev.	Date	Description
01	Jan 2025	Initial release of document for Student Analytics 25.0.0. See [Version 25.0.0]().

Contents

Welcome to Student Analytics Help

This help system outlines the specifications of Student Analytics, the current Business Intelligence offering from Anthology Inc. It provides an overview of the architecture and design of Student Analytics, a functional overview, and some basic user guidelines.

The help system supports the current Student Analytics version and one prior versions. Help topics that have been added or modified during the release cycle display a version selector at the top of the topic pane. Use the version selector to reveal help content for the prior version.

To access the resources provided with this help system, see Attachments and Links.

For installation instructions, refer to Installation Manager Help.

Version 25.0.0

Student Analytics 25.0.0 Release Notes

- Data Model Specification: updated for version 25.0.0.

- In the latest Anthology Student Analytics 25.0.0 release, the following columns in various tables for compatibility with the Student Database has been enhanced. These changes prevent data truncation errors, ensuring a successful initial and incremental load.

Table Name	Column
SyStaff	Descrip
SyStaff	FirstName
SyStaff	LastName
AdCourse	Descrip
AdCourse	Code
AdCourse	CatalogCode
AdProgram	Descrip
AdProgram	Code
AdEnroll	AdProgramDescrip
AdEnroll	StuNum
AdProgramGroup	Descrip
AdProgramVersion	Descrip
AdProgramVersion	Code
AdTerm	Descrip
AdClassSched	Code

AdClassSched	Descrip
AdEnrollSched	Descrip

Version 24.0.0

Student Analytics 24.0.0 Release Notes

- Data Model Specification: updated for version 24.0.0.

Version 5.5.3

Student Analytics 5.5.3 Release Notes

- Resolved Null exceptions during incremental load.

- Modified the data type for AdEnrollsched.TranscriptComment and FaSysComments.Comment in the Dat-awarehouse stage tables to ensure compatibility with the Student Database.

Architecture and Components

The design of Student Analytics is based on a four-layer architecture consisting of the following:

- Source Layer
- Data Warehouse (DW) Layer
- Semantic Layer
- Data Visualization Layer
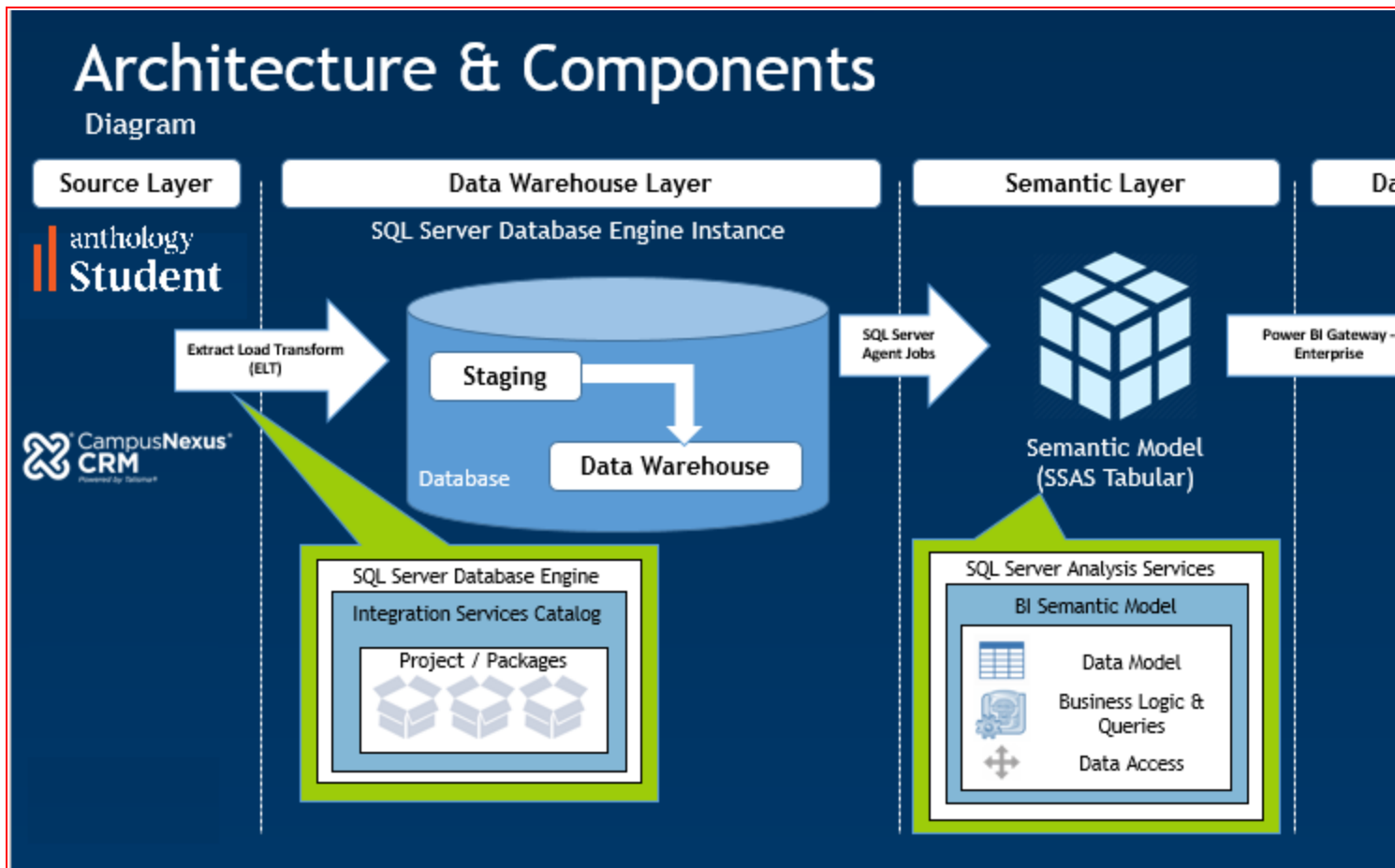
Source Layer

The Anthology Student and/or CampusNexus CRM databases serve as the source of data throughout Student Analytics.

Day-to-day changes made to the databases (insert, update, and delete operations) are captured using the Change Data Capture feature of SQL Server 2016/2017 releases.

Anthology Student

To track changes to the required Anthology Student database source tables, change data capture is further enabled for these individual tables with specific lists of columns to be captured. This, in turn, creates new change data capture metadata tables under a new database schema 'cdc', called 'change tables', for each of the source tables. The change tables serve as a repository for the changes that occur to the data in the individual source tables, supporting incremental updates to the Data Warehouse. Upon upgrading an Anthology Student database with Student Analytics, an additional database file group 'C2000_FG_CDC_Analytics' and database file are created to contain the change tables.
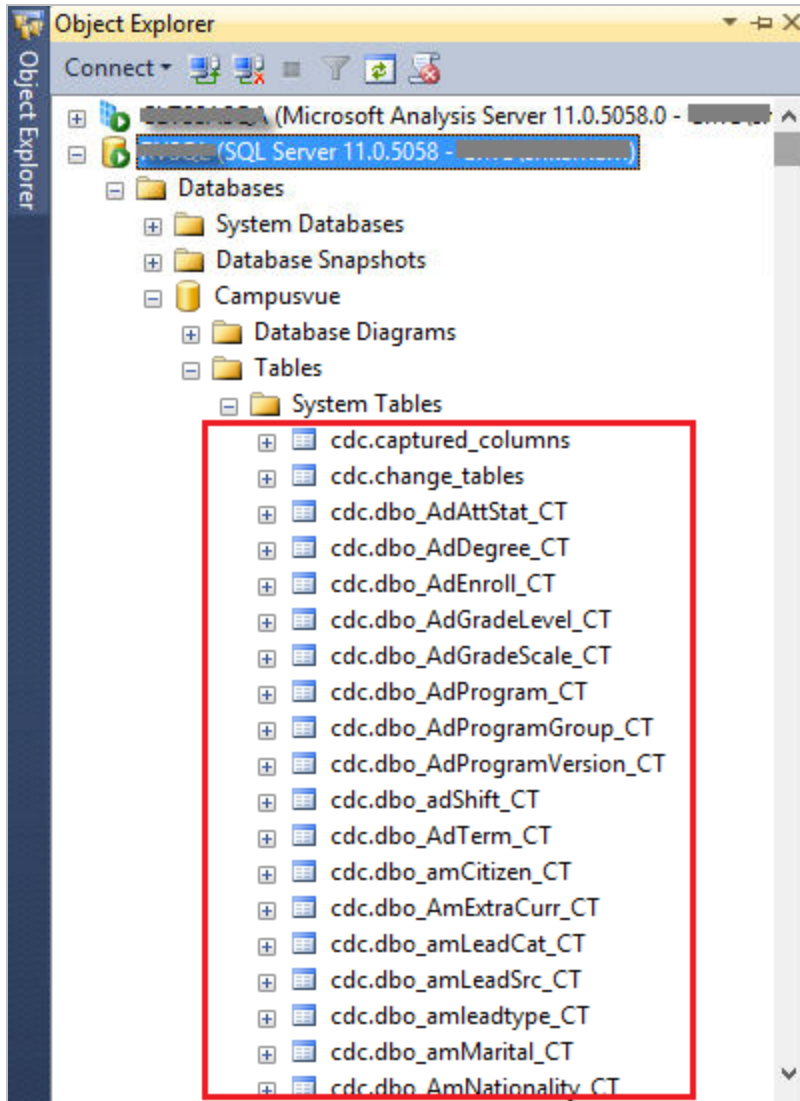
Tables Enabled for Change Data Capture

Refer to **Anthology Student Tables and Columns enabled for CDC.xlsx** (included in Analytics Technical Guide.zip) for a detailed list of CampusNexus Student source tables along with the only subset of columns that need to be tracked. For performance reasons, not all columns are tracked.

NoteNOTE: Prior to release of Student Analytics 5.5.2, the installation process involved a verification step to disable Change Data Capture on columns that were not part of the Student Analytics configuration. The introduction of

5.5.2 prevents the disabling of Change Data Capture on columns that are not included in the Student Analytics configuration.

CampusNexus CRM

To track changes to the required CampusNexus CRM database source tables, Change Tracking is further enabled for tables that are being tracked. Change Tracking functions are used to obtain information about the changes.

Note: The Higher Education Foundation (Higher Ed) setup must be installed on the CampusNexus CRM environment. Campaign Support for the Lead object must be installed prior to the installation of CRM Analytics.

Objects and Related Tables Enabled for Change Tracking

The tables of the following CampusNexus CRM objects are used as source tables for the Data Warehouse to support the current model.

ObjectName	TableName	ObjectName	TableName
Area of Interest	tblObjectType20018	Education Level	tblObjectType20016
Area of Study	tblObjectType20023	Enumerations	tblEnum
Campaign	tblCampaignMain		tblEnumLangName
	tblCampaignAction	Ethnic Group	tblObjectType20029
	tblURLClickStatus	Lead	tblObjectType20005
	tblMailOpenRecord		tblObjectType20005_x
	tblOBMReportMailer	Lead Source	tblObjectType20015
	tblSMSCampaignDetails	Lead Type	tblObjectType20021
	tblSMSDetails	Mailer	tblOutBoundMailer
	tblSMSReport	Nationality	tblObjectType20030
	tblCampaignTarget	Program	tblObjectType20008
	tblURL	Program Level	tblObjectType20020
	tblTrackableURLClickRecord	Program Version	tblObjectType20009
Contact	tblCustomer		tblObjectType20009_x
	tblCustomer_SisConnector	SIS User	tblObjectType20036
	tblObjectType3_x	State	tblObjectType20017
Country	tblObjectType20014	Team	tblTeam
Dependency	tblDependency	Term	tblObjectType20007

Note: The "_x" suffixed to a table name indicates one or more underlying secondary tables of an Object.

SQL Server Agent Jobs

Databases that are "change data capture enabled" are typically associated with two SQL Server Agent jobs: one to populate the change tables (i.e., the "capture" job), the other to be responsible for change table cleanup (the "cleanup" job). Both the capture and cleanup jobs are created using default parameters when the Change Data Capture feature is enabled.

- The capture job is started immediately. It runs continuously, processing a maximum of 1000 transactions per scan cycle with a 5-second waiting period between cycles.

- The cleanup job runs daily at 2 a.m. It retains change table entries for 4320 minutes (3 days), removing a maximum of 5000 entries with a single delete statement.

For additional information about SQL Server Agent jobs, refer to the MSDN Library topic Change Data Capture Agent Jobs.

Data Warehouse Layer

The data warehouse layer is comprised of the staging area, which is a temporary storage area utilized in the Extract Load and Transform (ELT) process, and the data warehouse which is the more permanent storage area for data in a denormalized format. The ELT process utilizes the SQL Server Integration Services (SSIS) platform and SSIS Catalog framework for data extraction and for updating the dimension and fact tables in the data warehouse.

There are two sets of SSIS packages:

- The first set, developed using the Change Data Capture and/or Change Tracking related tasks and components, extracts the initial and incremental change data (flagged as INSERTs, UPDATEs and DELETEs) from the source and stores it in a staging area.

- The other set transforms the stored data in the staging and lookup tables and updates the dimension and fact tables in the data warehouse.

The staging area and the data warehouse tables reside in the same SQL Server instance and same database. SQL Server Agent jobs are created on this instance to execute the initial and incremental SSIS packages.

Depending on whether Anthology Student or CampusNexus CRM are standalone sources or they are integrated, appropriate steps are added to the jobs. For example, if CampusNexus CRM exists as a single source, then only the steps relevant to the CampusNexus CRM are added to the jobs.

The recurring schedule of the SQL Server Agent job for the incremental updates can be changed as required. An additional SQL Server Agent job is created to purge stale records from the staging tables for performance reasons.
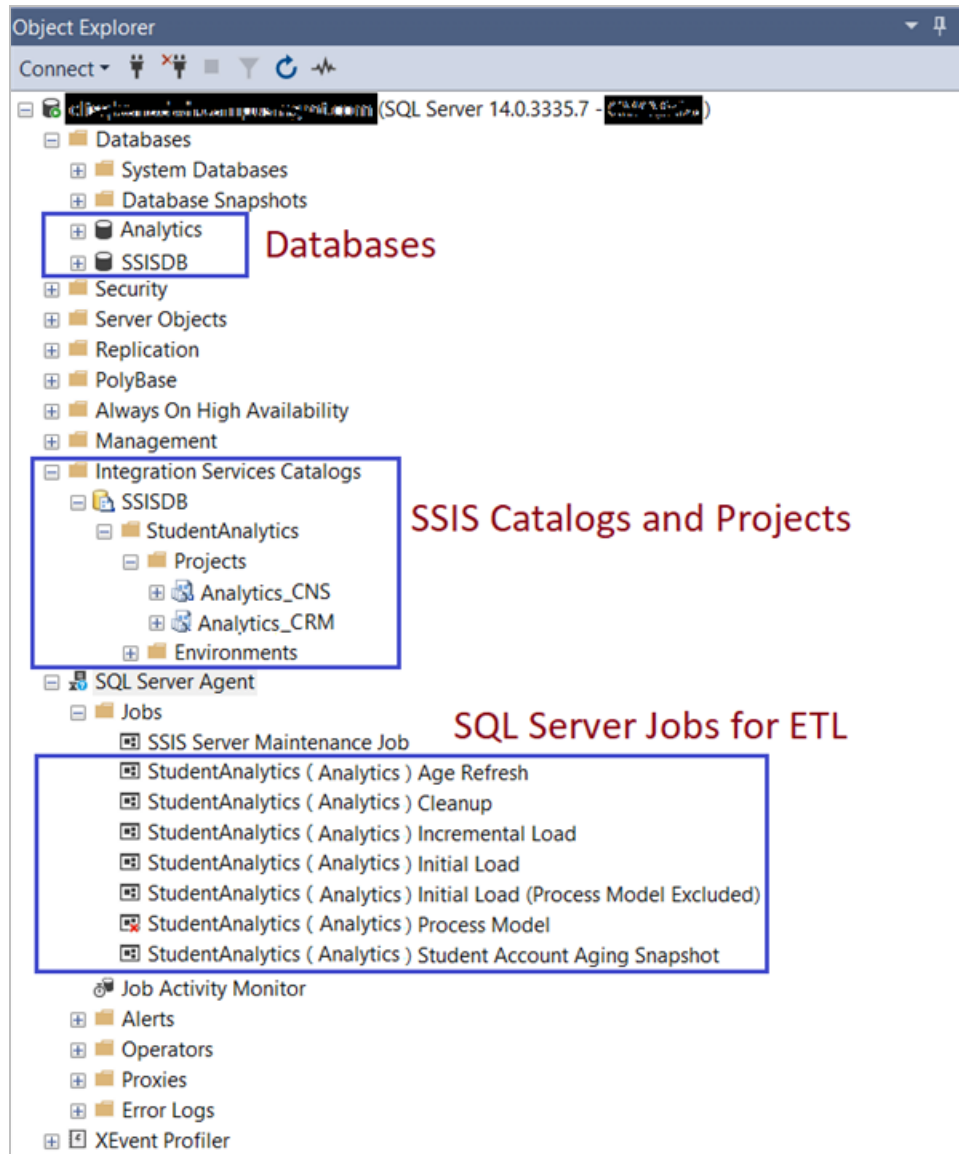
The "Age Refresh" job is scheduled to run at 12.00.00 a.m. on the first day of every month. This job updates all Student, Prospect, CRM Contact, and Lead age data.

Analytics 4.1 adds the "**Student Account Aging Snapshot**" job, which is scheduled to run every day at 12.00.00 a.m.. This job creates monthly Student Account Aging Snapshots for current and past 1 year. It considers the last day of the month as "As of Date" for creating the monthly snapshots. For example, the January 2021 snapshot is created by considering 31st January 2021 as "As of Date".
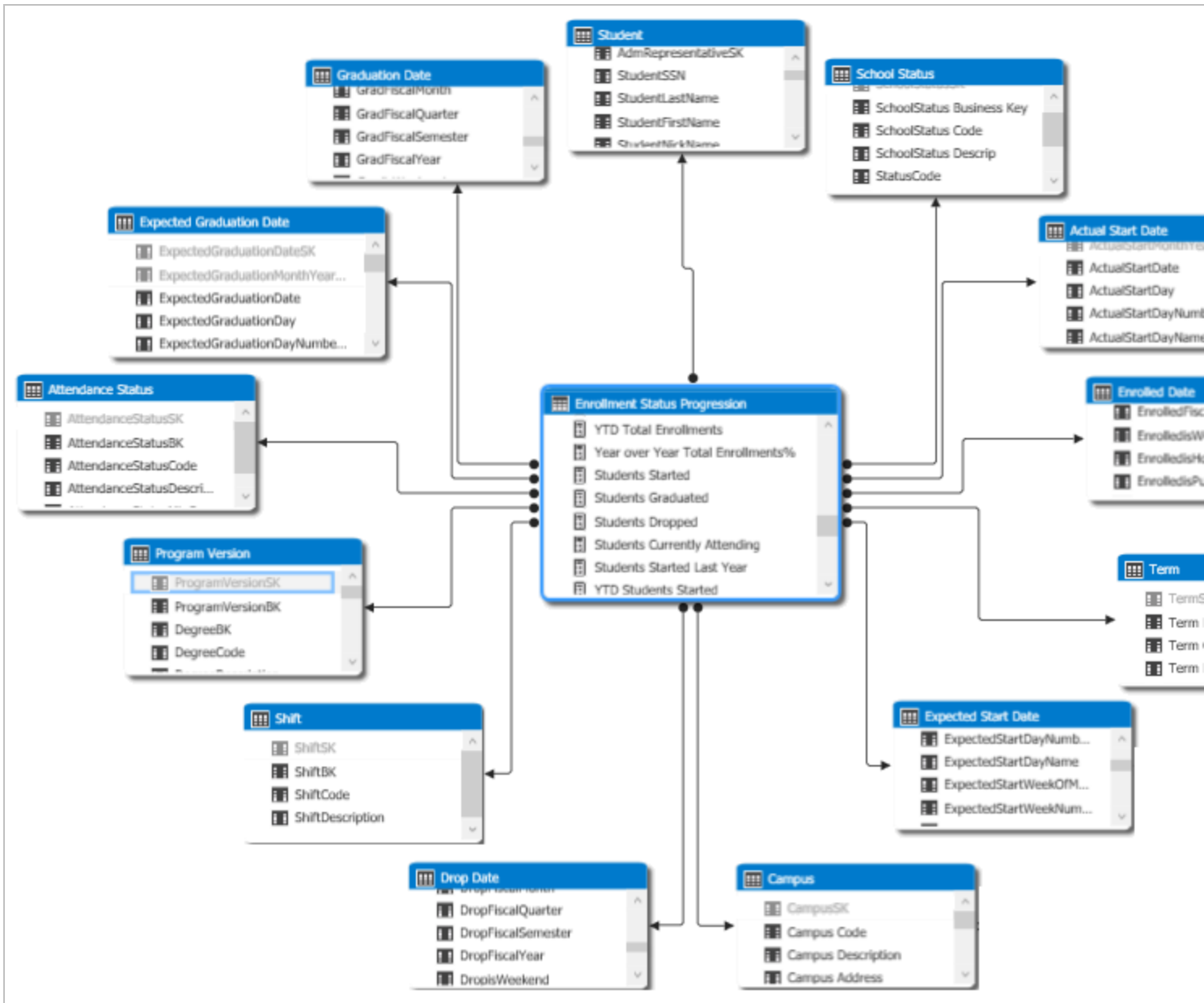
It also creates one snapshot for the current month by considering the yesterday's date as "As of Date". On start of a new year, for example, 1st January 2021, the snapshots created for the year 2019 will be deleted.

Analytics 4.2 enables all jobs upon creation except the "StudentAnalytics (<data_warehouse_name>) Process Model", because processing of semantic model databases is now part of the Incremental Load job. The Process Model job can be used to manually process semantic model databases when needed.

The SQL Server job *"StudentAnalytics (Data warehouse database name) Initial Load (Process Model Excluded)"* has similar steps as the Initial load job but *"Process Model Database"* steps are excluded.

The data warehouse schema has a star schema architecture.

Dimension and Fact Tables

The Excel file **Dimensions and Facts List** (included in Analytics Technical Guide.zip) shows the list of Dimension and Fact tables that are available in the data warehouse database.

- Dimension tables contain the textual descriptors of the business and typically contain many columns or attributes. These attributes describe a row in the given table, which is a representation of certain business objects such as Programs, Prospects, and Students.

- Fact tables contain the measurable facts, trends and quantitative information in relation to the dimensions,

such as the count of prospects who enrolled during a certain period of time, or the time taken for a prospect to enroll from the time he/she inquired about a program.

Enterprise Data Warehouse Bus Matrix

The Excel file **EDW Bus Matrix** (included in Analytics Technical Guide.zip) contains the Enterprise Data Warehouse Bus Matrix representing the business analysis/processes and associated dimensionality.

For more information, refer to **How to use the bus matrix.pptx** (included in Analytics Technical Guide.zip)

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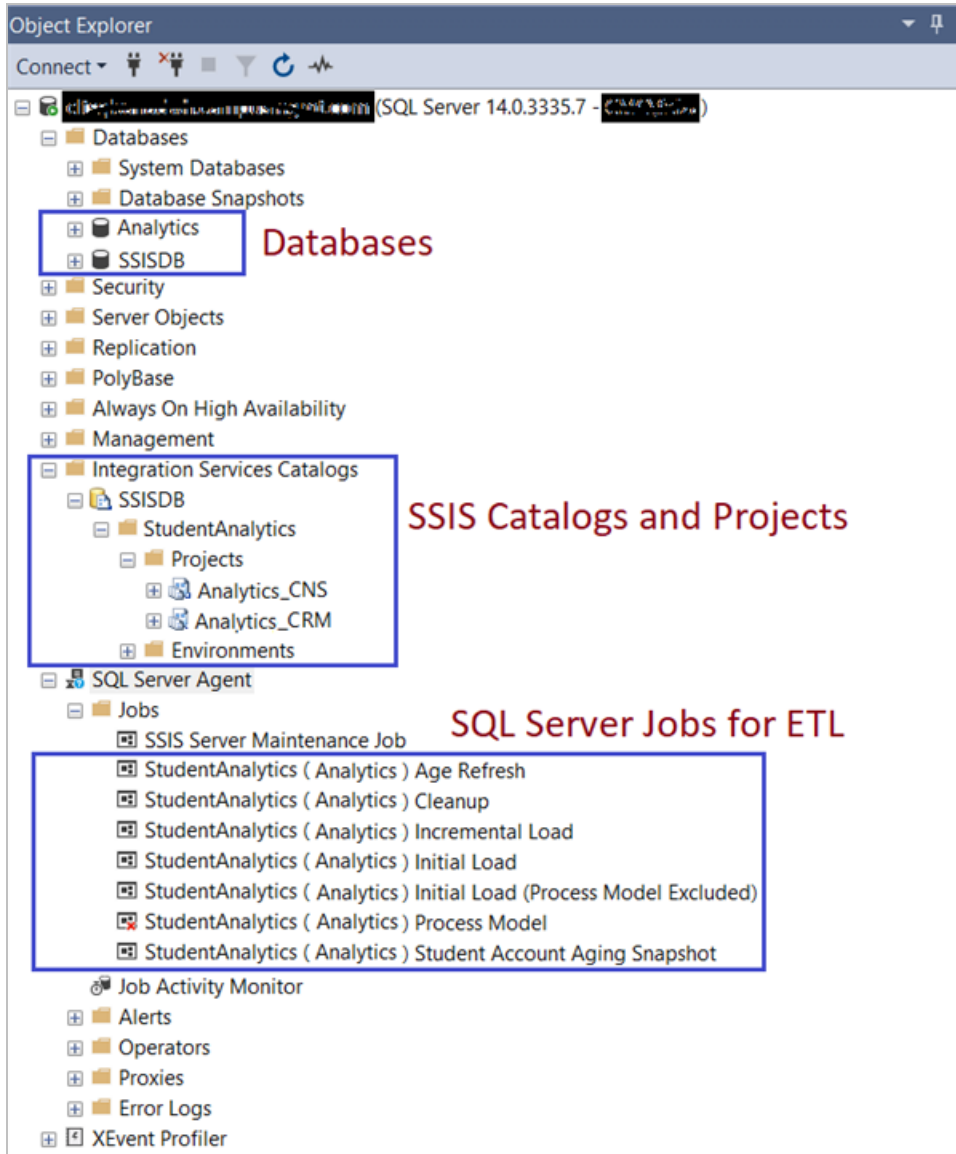
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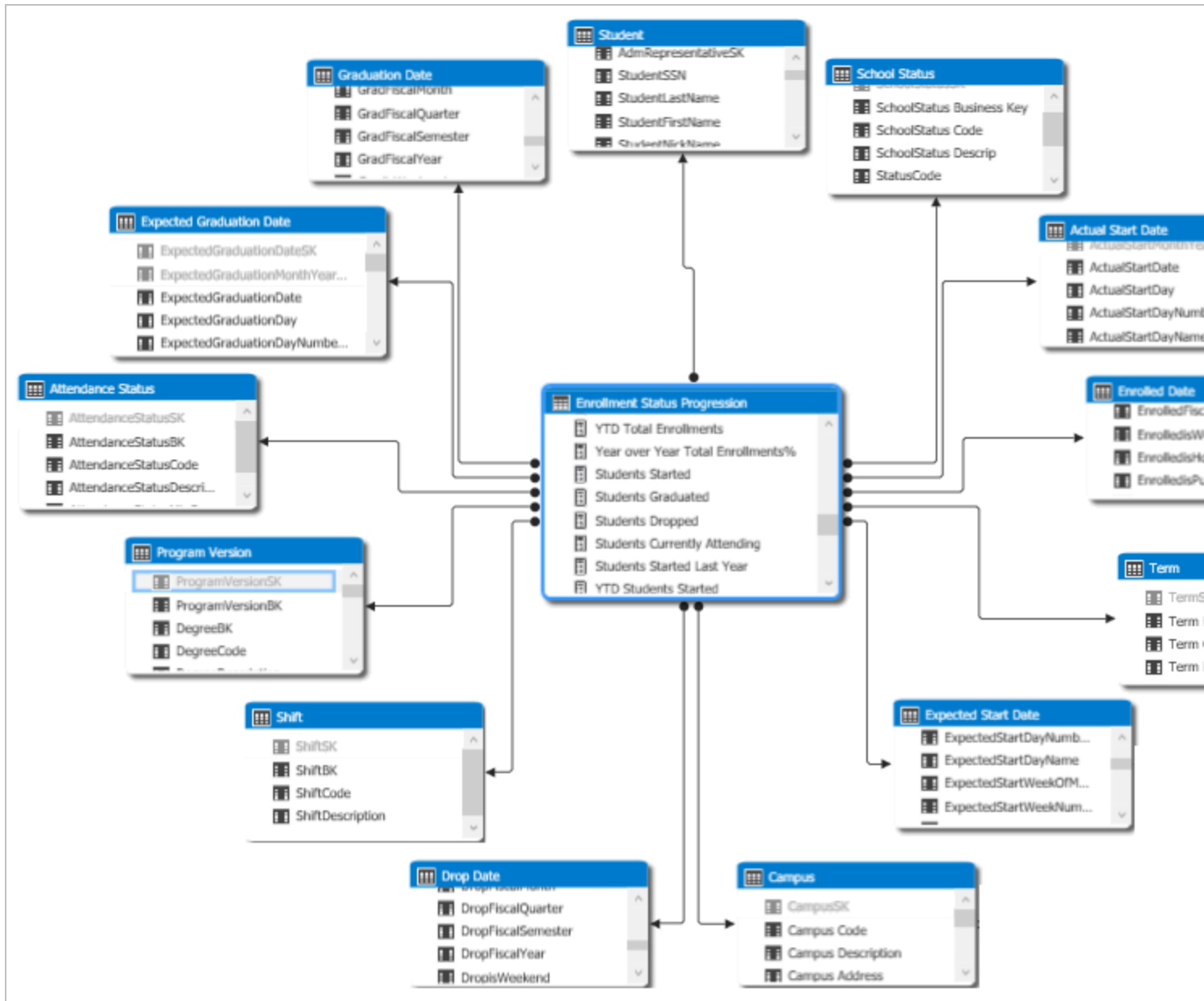
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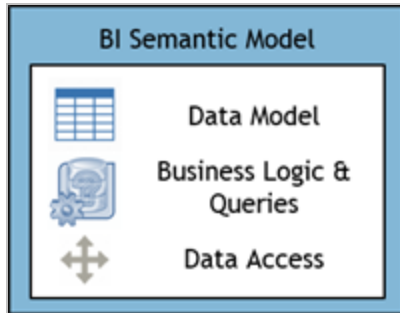## Enterprise Data Warehouse Bus Matrix

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Semantic Layer

The Online Analytical Processing (OLAP) layer uses the SQL Server Analysis Services (SSAS) platform in tabular mode (SSAS Tabular). Tabular models are in-memory databases in Analysis Services.

The BI semantic tabular model deployed on the SSAS for Anthology Student and/or CampusNexus CRM is configured to process and contain the data from the data warehouse. Separate semantic tabular models are implemented for Anthology Student and CampusNexus CRM to address specific analysis.

This semantic model consists of dimensions and facts from the data warehouse (data access) and various measures applied across the facts (business logic and queries), facilitating data analysis from various perspectives. Examples include conversion rates, year-to-date totals, year-over-year growth rates, and so on, across the Campus dimension or Program dimension.

List of Semantic Models

The table below contains the list of semantic models available to address specific modules of Anthology Student and CampusNexus CRM.

Semantic Model Name	Product	Module
Model	Anthology Student	Admissions & Academics
Financial Aid Model	Anthology Student	Financial Aid
Campaign Model	CampusNexus CRM	Campaigns
Career Services Model	Anthology Student	Career Services
Student Accounts Model	Anthology Student	Student Accounts

Semantic Model Name	Product	Module
Contact Manager Model	Anthology Student	Contact Manager

Each of the semantic models contains measures (also called calculated fields) that are created using Data Analysis Expressions (DAX) formulas. These measures are placed in the VALUES area of a report, where the X or Y axis labels that surround it provide the context of the value.

Example:

The "Conversion Rate %" measure in the "Prospect Status Progression" measure group, when used against the Lead Year, filtered by Year 2010 to 2016, would calculate the value, at run time, based on the given Lead date and year.

Customize Retention Days, Fiscal Period, and Academic Year

As part of the initial data load, you can customize the retention days for the staging table, offsets for fiscal periods, and offsets for academic years.

- The retention days value determines how many days data is kept in the staging table before the data is deleted.

- The fiscal period and academic year offset values determine the beginning and end of the fiscal and academic year periods.
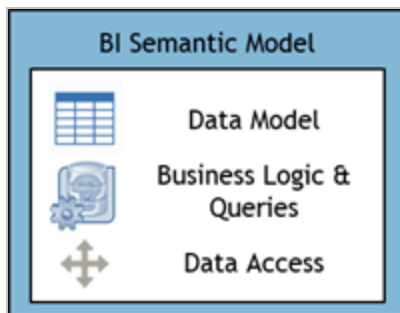
You can choose values that match the needs of your institution. For more details, see Analytics Post Installation Tasks in Installation Manager Help.

List of Measures and Expressions

The Excel file **Measures and Expressions in Analytics** (included in Analytics Technical Guide.zip) contains the complete list of measures for CampusNexus Student along with the DAX expressions used to calculate the measures.

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Data Visualization Layer

Note: The Data Visualization Layer described here requires customers to obtain a Power BI license through Microsoft and is not included as part of Student Analytics.

The Data Visualization layer leverages Microsoft Power BI, enabling users to connect to the semantic model (as a dataset) and create rich visualizations which can be organized on a canvas to build Reports or pinned to build Dashboards and shared across the enterprise.

An administrator must subscribe to the Power BI cloud offering from Microsoft and set up a tenant before using Student Analytics. The tenant is the container for items of your institution such as users, domains, subscriptions, and so on.

The On-premises Data Gateway needs to be configured for the SQL Server Analysis Services tabular model. When you use the gateway, there is a live connection to an Analysis Services tabular model database located on-premises. When you interact with a visualization, queries are sent from Power BI directly to the database. The updated data is then returned and visualizations are updated. Your data remains on-premises. Because there is a direct connection between Power BI and the database, there is no need to set up a refresh schedule.

To learn more about the Power BI building blocks, see https://docs.microsoft.com/en-us/power-bi/guided-learning/gettingstarted.

Security

Out-of-the-box, the semantic models are deployed with two roles: *ReadOnly* and *Administrators*. These roles can be used to define member permissions and access to the models. After Student Analytics is installed and the semantic models are deployed, database administrators can add and remove members from the required roles.

The table below describes the roles and permissions.

Role Name	Permission Granted	Description
ReadOnly	Read	Members are allowed to query data only.
Administrators	Administrator	Members can query data and run process operations.

For detailed information on roles in SSAS Tabular, please refer to this Microsoft article.

With Power BI, users in the organization can connect to the on-premises data source, i.e., the Analysis Services server where the semantic model resides, once the On-premises Data Gateway is installed and configured. The gateway facilitates the communication between a user in Power BI to the on-premises Analysis Services server. The user should be mapped to the appropriate role created in the semantic model.

For detailed information on security considerations, please refer to this article from the Power BI Support site.

Hardware/Software Requirements

Use the **Analytics Size Estimation Worksheet** (included in Analytics Technical Guide.zip) to determine the minimum hardware requirements, amount of disk space and RAM required for your installation of Student Analytics. The spreadsheet is also available on the FTP site.

For information on compatibility with operating platforms and other products, see Platform Compatibility and Product Compatibility (logon required).

Data Model Specification

To view the data model details, open the **DataModel.zip** file (included in Analytics Technical Guide.zip).

Attachments and Links

Attachments

Click here to download the Analytics Technical Guide **zip** file (includes PDF of Analytics Help and all attached files).

NoteNote: With the release of 25.0.0, the documents associated with this release remain identical to those of version 5.5.x except for the Data Model.

Links

Anthology Inc.

- Platform Compatibility and Product Compatibility
- Installation Manager Help
- https://support.campusmgmt.com/ (Service Desk logon required)
- https://filetransfer.campusmgmt.com (FTP site logon required)

Microsoft Docs

- About Change Data Capture (SQL Server)
- Tabular Models
- Roles (SSAS Tabular)
- Power BI Documentation
- Power BI Guided Learning - Getting Started

Configuring Power BI in Anthology Student

Purpose of this document

One feature of Anthology Student is its ability to integrate with Power BI. This allows Anthology Student to list and display any Power BI dashboards, personal workspaces, and shared apps that belong to the current logged-in user.

By default, this feature is disabled. To enable this feature, a series of steps need to be completed by an administrator. These steps are listed below and will correctly enable the Power BI integration within an existing Anthology Student solution.

Summary of steps

1. Register Anthology Student within Power BI

2. Obtain your Tenant ID and validate the Power BI registration

3. [Configure your Anthology Student solution](#)

4. [Test the Power BI integration](#)

Before we start

You will need to know the URL where you have the Anthology Student solution published, for example, http://www.university-home.com/Cmc.Nexus.Web

The above URL will be referred to as the host name ([host-name]) within this document.

While following the steps in this document, you will need to gather and save 3 important values:

1. TenantId
2. ClientId
3. ClientSecret

These are long alphanumeric values, so it is recommended you save them into a text file during this process to avoid errors. Keep this file in a safe place to guard it against unauthorized user access, since it contains the ApplicationSecret (which is a password).

Once you have completed the steps in this document and you have tested that the integration is working successfully, you can delete this text file if you wish.

Register Anthology Student within Power BI

1. As the Power BI administrator have your log in credentials ready.

2. Open a browser to the following Power BI Developer API.

   https://dev.powerbi.com/apps
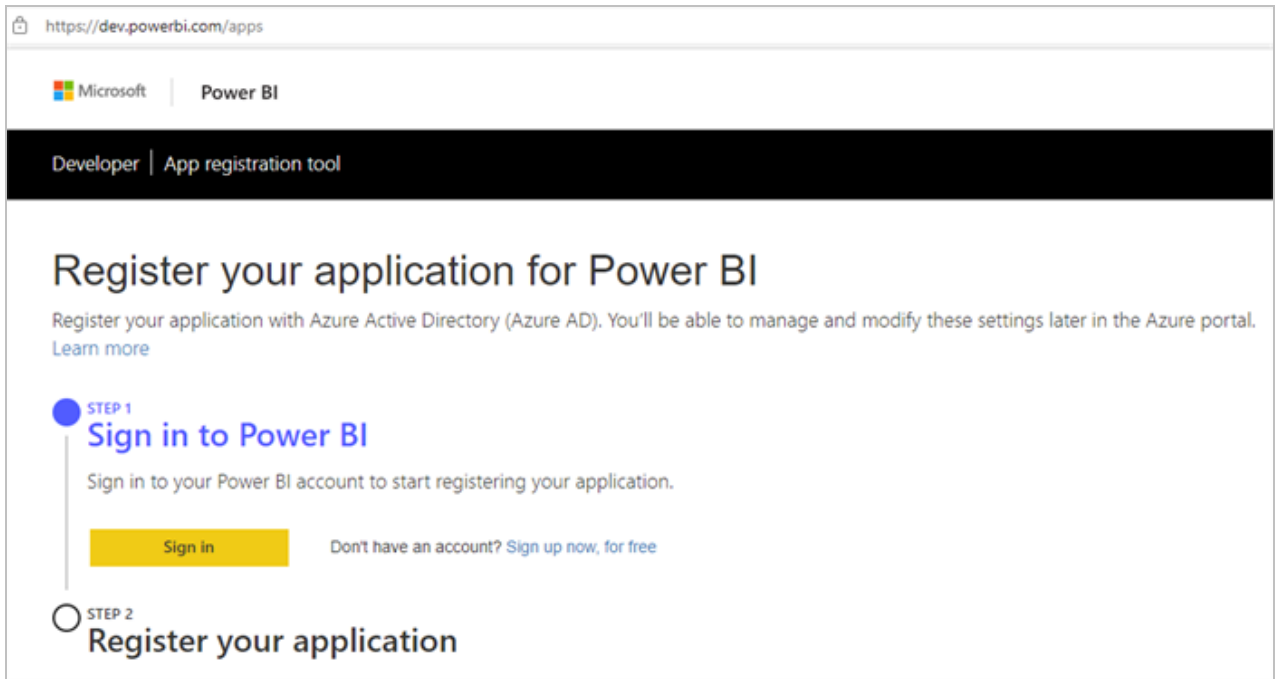
3. Enter the details of your Anthology Student solution as shown below.

Enter the app details as shown below:

App Name: Enter any app name you prefer. Recommendation: use "Anthology Student Power BI Integration"

App Type: Server-side Web App

Home Page URL: [host-name]

Redirect URL: [host-name]/Account/OAuthTokenRedirect

Select all items shown (unless you need to restrict some access).

4. Select **Register** to get your Application ID and Application Secret.

Once you select the "Register App" button, the Application ID and Application Secret fields will appear in a pop out window.

> ⚠️ **Important! Please read.**
>
> Save the Application ID and Application Secret to a text file. Do not lose this file. **You will not have access to the Application Secret again!** You can delete this file once you complete the steps in this document.
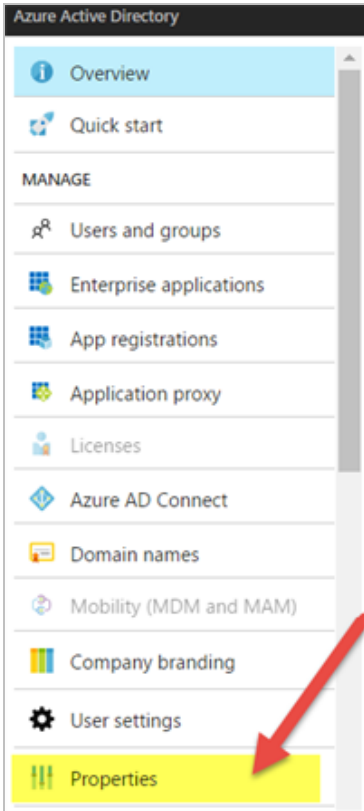
Obtain your Tenant ID and validate the Power BI registration

1. Log in to your Azure account in http://portal.azure.com.

2. Find the **Azure AD** resource.

   At the top of the Dashboard, search for "Azure Active Directory" using the Search field. Select on this option to navigate to your Azure AD.
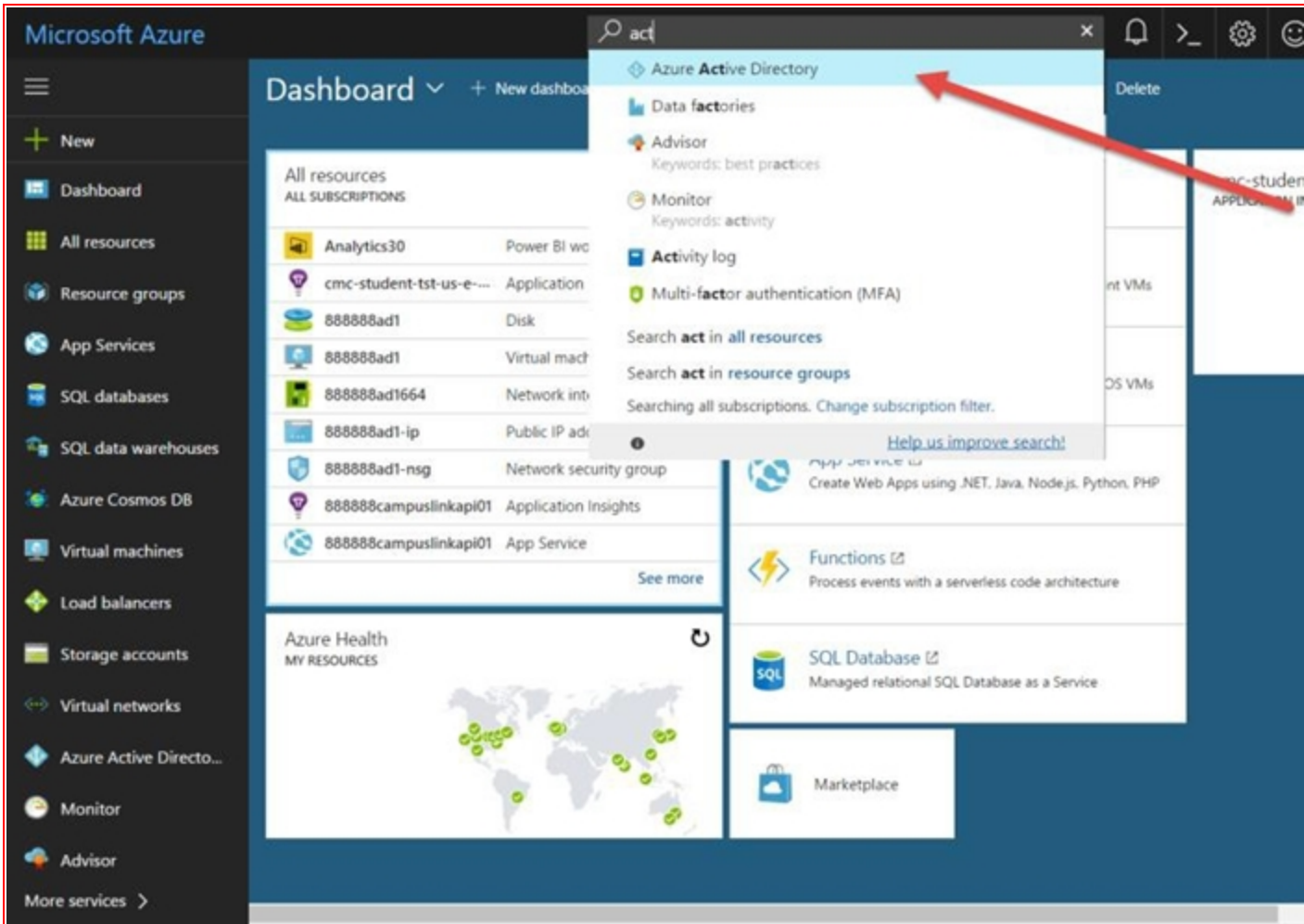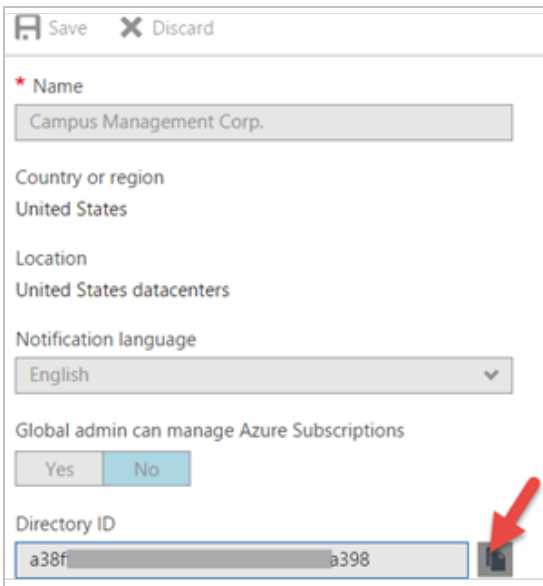

3. In the Azure AD menu, select **Properties** (as shown below).
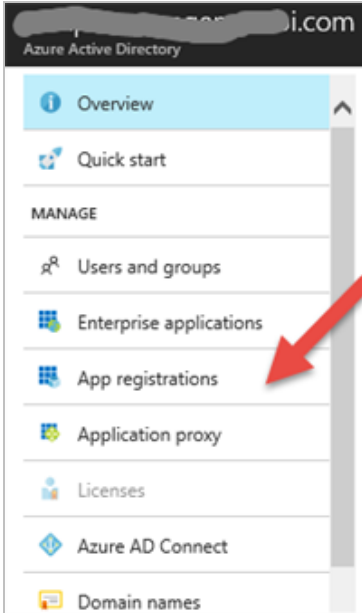
4. Copy the ID for your Azure AD.

When you see the screen below, select the icon to copy the ID shown to your clipboard.

> ⚠️ **Important! Save this ID to a text file!**
>
> Save the Directory ID shown here to a text file. You will need it later. **This ID will be referred to as "Tenant ID"** from now on.

5. Return to the Azure AD menu and select **App registrations**.

6. Check that your Power BI registration appears here.

If the app registration "Student Power BI Integration" is listed here, then your Power BI app registration has completed successfully. Proceed to the next step.

Configure your Anthology Student solution

Note:

If you are an Anthology Inc. hosted customer, you will supply the TenantID, ApplicationID, and ApplicationSecret values to the Deployment team with a Service Desk ticket and they will add them to the installer.

If you are a self-install customer, you enter the values in Installation Manger > Web Client > Options > Power BI tab and apply the changes.

When Installation Manager is run, the following keys are updated with the values provided by the user:

- `<add key="PowerBi.Enabled" value="false"/>`

  The value in this line is changed from "false" to "true".

- `<add key="PowerBi.RedirectUrl" value="[host name]/Account/OAuthTokenRedirect" />`

  The [host name] is changed to match your Anthology Student hosting.

  For example: "http://www.AnthologyCollegeOne.com/Account/OAuthTokenRedirect" or "https://sisclientweb-XXXXXX.campusnexus.cloud/Account/OAuthTokenRedirect"

- `<add key="PowerBi.TenantId" value="[tenant id]"/>`

  The "tenant id" is changed to the value you obtained from your Azure AD in step # 2.4.

  For example: "b34fy870-9c86-35df-7e6b-8b01f206a398"

- `<add key="PowerBi.ClientId" value="[client id]"/>`

  The "client id" (your Application ID) is changed to the value you obtained from Power BI in step # 1.4.

  For example: "jy7yTGr-b040-4437-883b-7258a317766c"

- `<add key="PowerBi.ClientSecret" value="[client secret]"/>`

  The "client secret" (your Application Secret) is changed to the value you obtained from Power BI in step # 1.4.

  For example: "gXiOy6N8R6uajuhygt54rORVXkC2XScoE5F+y9H24B8="

Test the Power BI integration

You should now be able to log in to Power BI from Anthology Student and see the Power BI Reports and Dashboards on the home page.