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Autodesk Inventor®, Vault® PDM Dynamics Business Central® Integration – AV2BC

Version 1.3.7

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Introduction

This document explains how to use install and use Autodesk Vault or Autodesk Inventor and Navision or Dynamics Business Central integration application developed by PLM CAD UTILITIES AS. Autodesk Vault is trademark of Autodesk Inc. and Dynamics Business Central is trademark of Microsoft. This application supports Dynamics Navision 2013 R2 or above and Dynamics Business Central. In this document Navision, Dynamics Business Central and ERP words are used synonymously. This add-in can be used with Inventor also even if Vault is not being used.

Software requirements

Dynamics NAV 2013 R2 or above. Dynamics Business Central

Autodesk Vault 2019 or above. If you are using different version then let us know. We will provide different installer.

Autodesk Inventor 2018 or above.

Windows 64-bit operating system. If OS is 32-bit then please contact us

Dotnet Framework v4.7 or above

Functionality supported by this application

This application supports following functionality

1. Send Item and BOM information to Navision on demand using right click menu from Vault and by button click from Inventor.
2. Send Item and BOM information to Navision automatically after workflow
3. Supports creation of both Production and assembly BOMs
4. Production BOM versions are also supported
5. Functionality to compare Autodesk Vault BOM with ERP BOM. If Production BOM is used then it is possible to compare Autodesk Vault BOM with old versions of ERP BOM
6. Functionality to map Autodesk Vault properties to Navision fields exposed by Navision web services
7. Ability to control which users have access to this functionality
8. Ability to process data before sending data to Navision
9. Ability to exclude files from specific folders and their sub-folders to be considered for sending data to Navision
10. Autodesk Inventor add-in to send data from Autodesk Inventor and to see ERP data inside Autodesk Inventor
11. Supports functionality to create Purchase order, Purchase quote, Sales order, Sales quote, Purchase invoice, Sales invoice
12. Supports functionality to add attachments to Items, Purchase and Sales documents.

Licensing:

This product supports floating license model. License server has to be installed for licensing

Installation:

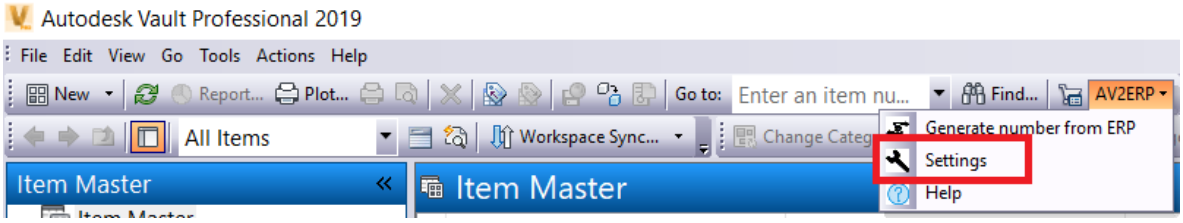
Installation of the application involves two steps

1. Installation of add-in
2. Installation of License server

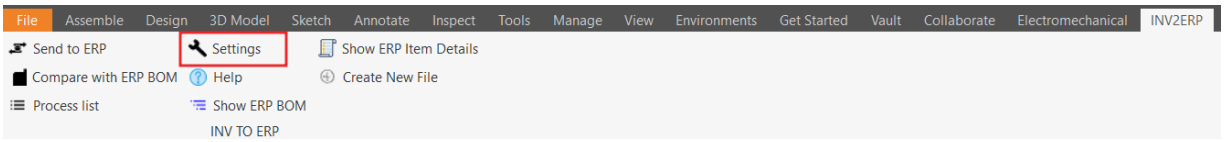
Installation process has been explained in Appendix A

Add-in settings

To launch settings, click the following button from Vault toolbar.



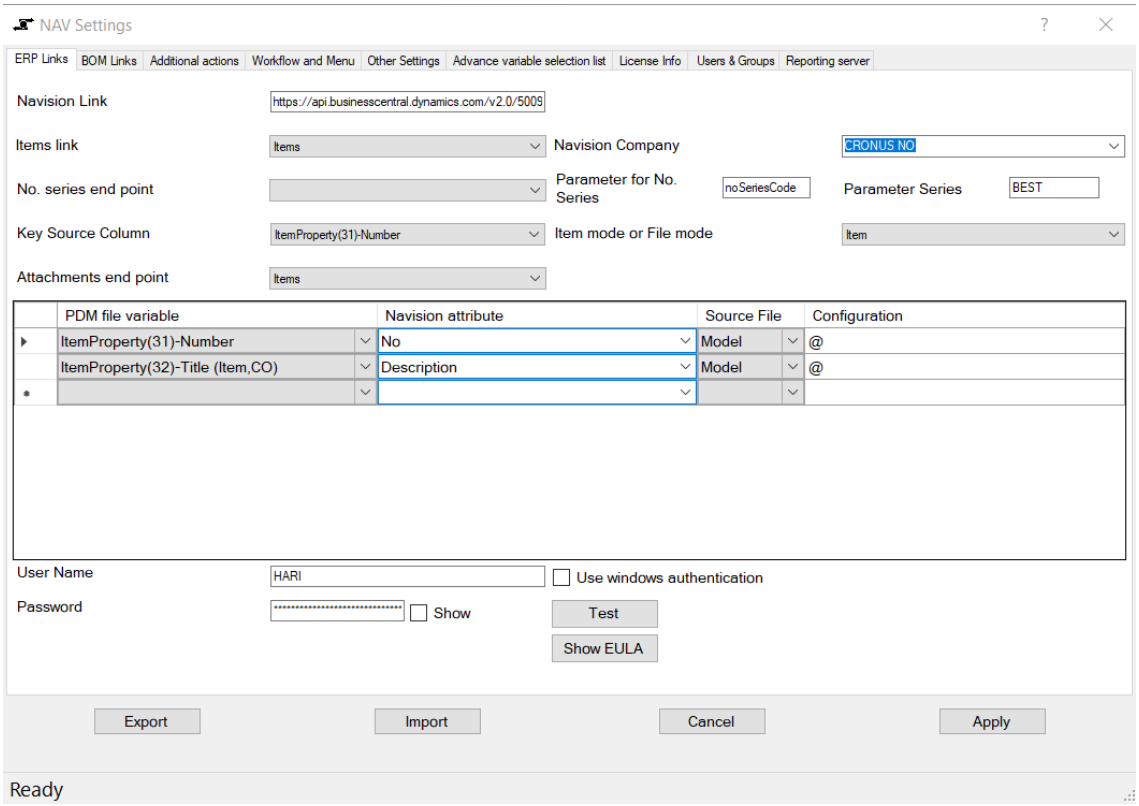
To launch settings from Inventor click following button



Putting correct settings in add-in is very important for this application to work. In below steps we have explained different options in add-in. After entering Navision Link, enter credentials and click on “Test Connection” button. If connection is successful then options for various links and “Navision Company” are populated

This add-in can be executed either in Item mode or File Mode. If Item mode is chosen then data from Vault items is sent to Dynamics Navision or Business Central. If File mode is chosen then data from files in Vault is sent.

ERP Links

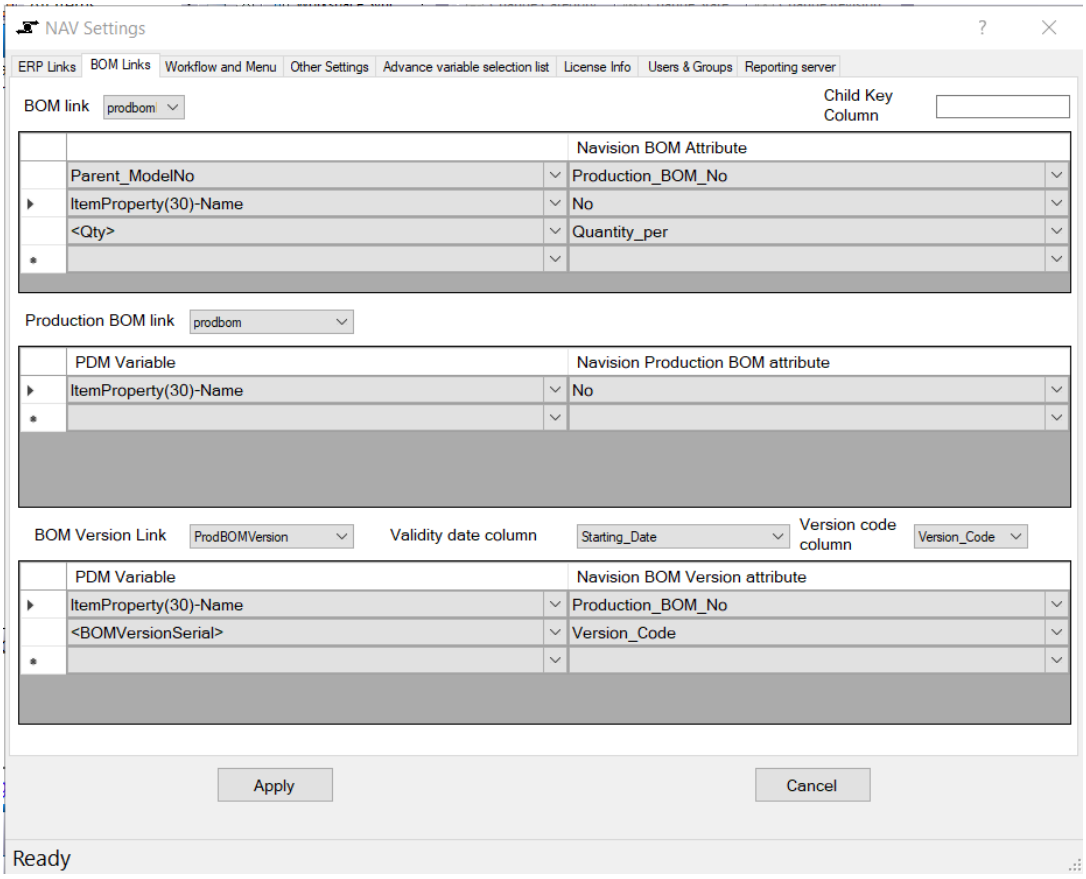


Below table explains various options in ERP Links tab

Option name	Description
Navision Link\Business Central Link	In this field provide the link to Navision ODataV3 or Odata V4 link. This should contain base Odata link. Example is http://desktop-3kqch51:7048/DynamicsNAV110/OdataV4. You can also provide Dynamics 365 Odata link. If Business central link is https://businesscentral.dynamics.com/xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx/Production then oDatav4 link will be like https://api.businesscentral.dynamics.com/v2.0/xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx/Production/OdataV4/
Items Link	Odata endpoint that exposes Item data
Navision Company\Business Central Company	List of companies supported by the instance. Choose the company to which data is sent
Key Source Column	This option is populated automatically. Change this to different field if item number in Autodesk Vault is different from that of item number in Dynamics Business Central
Number Series End Point	OData end point for generation of number series. This end point should take 3 parameters 1. Parameter for No. Series. This is input mentioned in next row 2. seriesDate. This will be the date of generation 3. modifySeries. This parameter should accept inputs True or False
Parameter for No. Series	Name of OData parameter that is used to give name of number series as input to OData end point
Parameter Series	Value of parameter mentioned in above field
Item mode or File mode(This setting is only for Autodesk Vault integration)	If item mode is chosen then data from Items is sent to ERP and if File mode is chosen then data from files is sent to ERP. Also, automatic transfer during workflows is done based on type selected.
Attachments end point	To add attachments to Items, select the end point that needs to be used for attachments. At present select same value as Items link. In future this might change.
Table	Table in ERP Links tab shows variable mapping between Autodesk Vault properties and Navision field. First row entry has to be key field for Navision Items data
PDM file variable\INV File Property	In this column select the Autodesk Vault property from dropdown list

Navision attribute\BC attribute	In this column select the Navision attribute exposed by Items Link endpoint
Source File	This column can be ignored
Configuration	This column can be ignored
User Name	Enter user name to connect to Navision if “Use windows authentication” is unchecked
Password	Enter password to connect to Navision if “Use windows authentication” is unchecked. For Dynamics Business Central it will be “Web Service Access Key” from user settings page
Confirm Password	Reenter the password
Show Password	Check the checkbox to see the password
Use windows authentication	Use this checkbox to ask application to use windows authentication instead of username and password.
Test Connection	Click this button to check connection settings. After clicking this button dropdown lists of Navision attribute and Navision BOM attribute are populated
Show EULA	Click the show EULA button to see the end user license agreement

BOM Links



This tab shows settings required for creation of Bill of Materials in Dynamics Navision or Dynamics Business Central. It contains two tables. In first table mapping between Autodesk Vault BOM properties and Navision (or Dynamics Business Central) BOM has to be given. Second table will be required if **Production BOM** needs to be created. For **Assembly BOM** creation second table can be ignored.

Option name	Description
BOM Link	OData endpoint that exposes BOM data
Child Key Column	This field is required if Item Number in Autodesk Vault is different from Item Number in Dynamics Navision or Business Central
BOM Table	BOM variables mapping between Autodesk Vault and Navision has to be mentioned in this table-First row should contain “Parent_ModelNo” in PDM BOM Variable column and “Parent_Item_No” or equivalent in Navision BOM Attribute
BOM Table – PDM BOM Variable	In this column select the name of Autodesk Vault BOM property corresponding to Navision BOM attribute
BOM Table – Navision BOM Attribute\BC BOM Attribute	In this column select the name of Navision BOM attribute from drop down list of attributes exposed by BOM endpoint
Production BOM Link	Select OData end point to create Production BOM if Production BOM is required
Production BOM Table	If Production BOM needs to be created in Dynamics Navision or Dynamics Business Central then this table needs to be filled
Production BOM Table – PDM Variable	In this column choose the name of Autodesk Vault property corresponding to Navision Production BOM attribute
Production BOM Table – Navision Production BOM attribute\BC Production BOM attribute	In this column Navision Production BOM attribute that needs to be filled
BOM Version Link	Select OData end point to create BOM Version if BOM Versions are being used for Production BOM
Valid date column	Select the OData BOM version link end point attribute that represents validity date field of BOM Version
Version code column	Select the OData BOM version link end point attribute that represents Version code of BOM Version

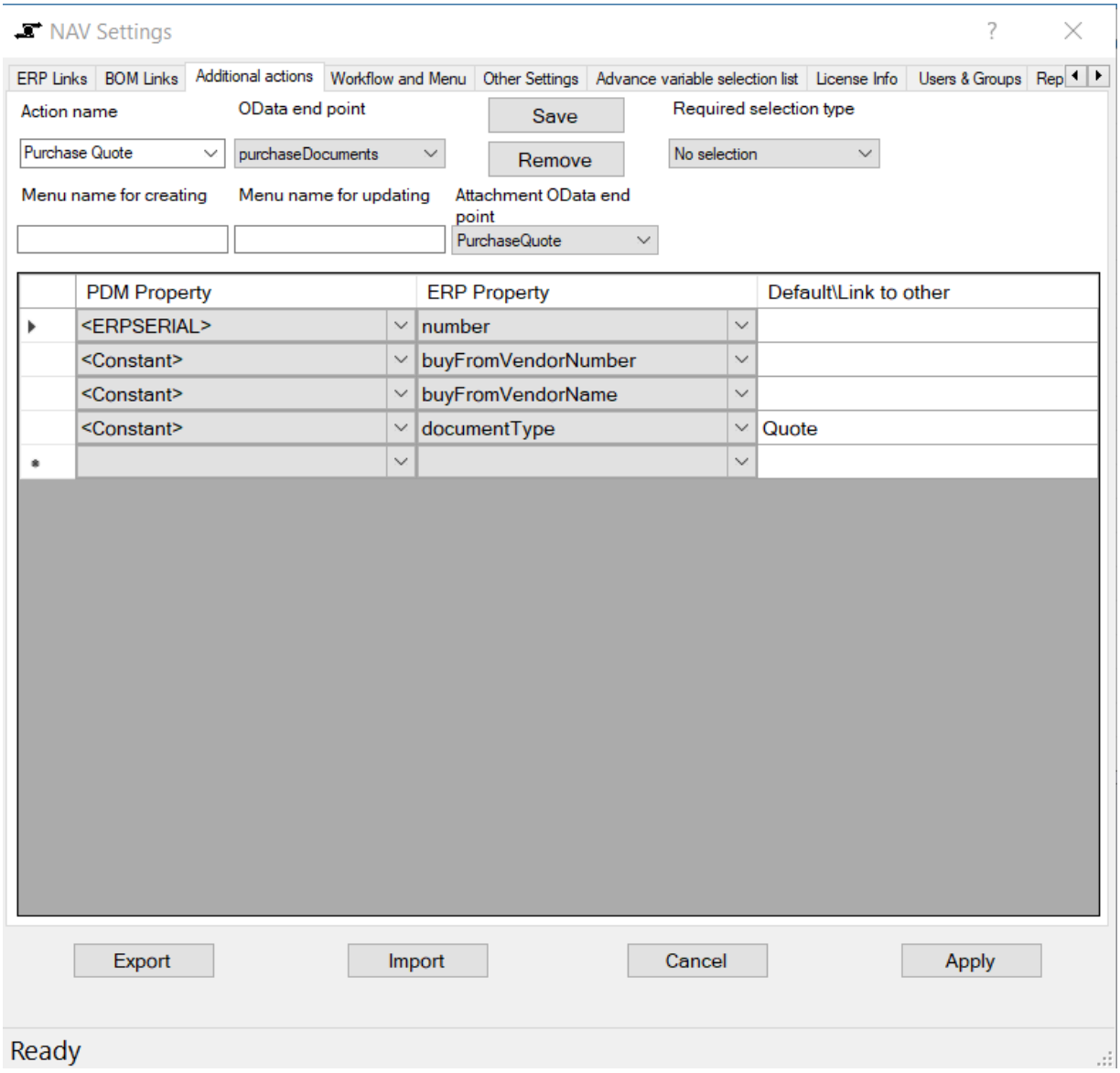
Version Table	In this table mapping between Autodesk Vault property and Dynamics Business Central BOM Version attribute is filled. First row should correspond to Production BOM number field and second row for Version code field.
Version Table-PDM Variable	Select Autodesk Vault property that maps to Version attribute. Select <ERPSERIAL> for Version_Code field if version code is generated automatically in Business Central. If version name needs to be any value other than any PDM variable or <ERPSERIAL> then select <CustomValue> and write custom logic in "Advance Variable Selection" tab inside method "GetBOMVersionNameCustomvalue".
Version Table-Navision BOM Version attribute\BC BOM Version attribute	Select the Dynamics Navision or Business central BOM Version attribute that needs to be filled here. Second row in this column represents BOM Version id. This field should be having same name in OData fields exposed by BOM Link for preview of BOM to work.

Additional actions

Use this tab to add information for creating Purchase order, Purchase quote, Sales order and Sales document. In the below example procedure to store information for creating Purchase quote has been shown below. Similar procedure can be followed for storing information to create other Purchase and Sales documents.

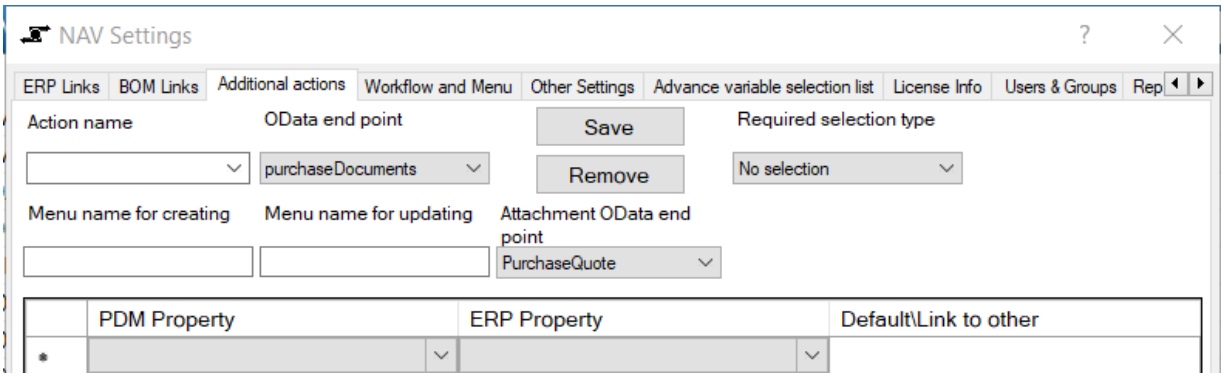
Add details for purchase quote

As shown in below image add details for Purchase Quote. **After adding the details first click on Save button and then on apply button so that settings are saved.** In the table enter other mappings for the for required fields as required. Use <Constant> for PDM property and to enter a fixed value. For Business central **Date fields**, select <CustomValue> in PDM column and in "Advanced variable selection list" tab return the value for the field using the function "`GetAdditionalActionCustomvalue`". <CustomValue> can be used for all other fields also if any special code needs to be executed to get required value for Business Central attribute. See "Appendix B" to know how to override the methods.

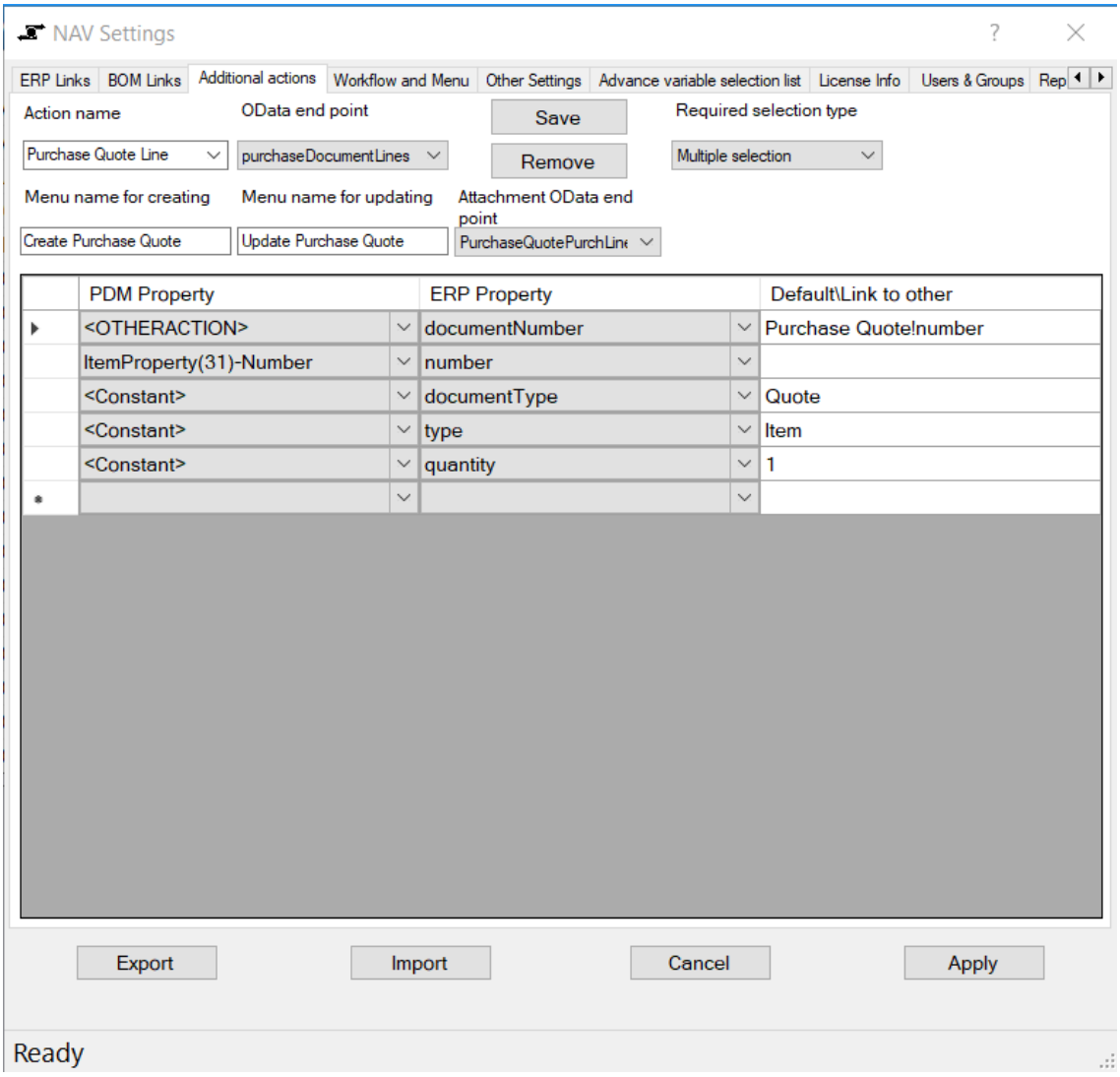


Add details for Purchase quote lines

After saving Purchase quote as per previous section, in the drop down after “Action name” select empty item as shown below. This will empty the table.



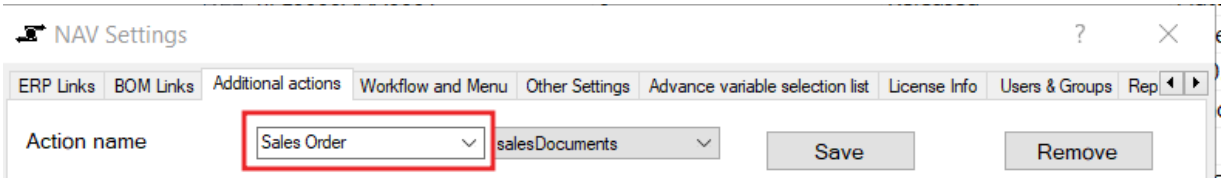
Now enter values as shown below for creating Purchase quote lines



Note: In the first row of table purchase quote needs to be referred by selecting "<OTHERACTION>" in first cell and "Purchase Quote!number". After entering required values click on Save button and then on Apply button to save the settings. Enter other required mappings for Business Central attributes in the table as required. Please refer to previous section to know about <Constant> and <CustomValue> entries.

Other Purchase\Sales entities:

For sales entities select "salesDocuments"\"salesDocumentLines" for oData end point as shown in below image

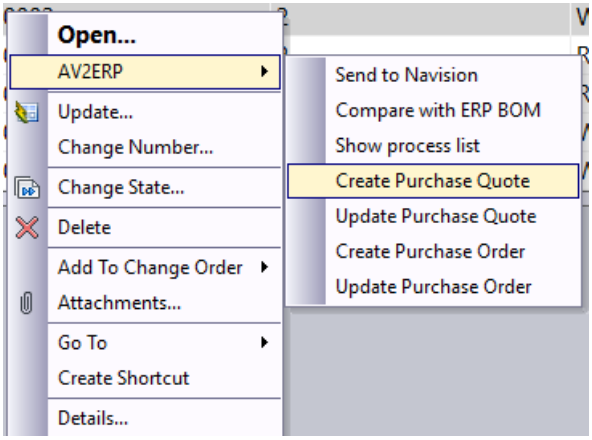


"documentType" attribute needs to be given correct value in third column of table based on document type. For "Quote documents" enter "Quote", for "Order documents" enter "Order" and for "Invoice documents" enter "Invoice".

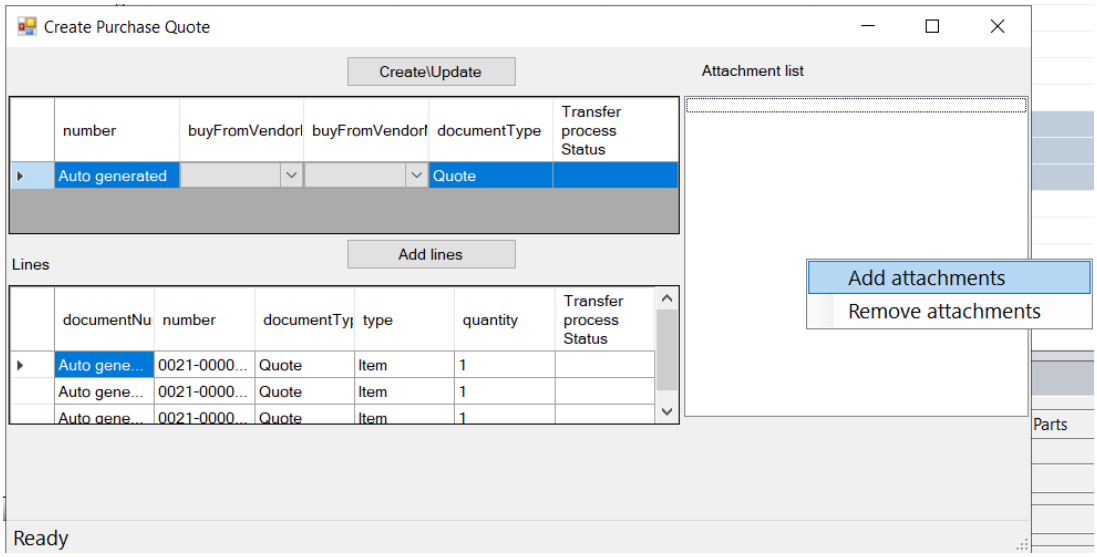
Creation of Purchase\Sales entities from Autodesk Vault

After adding required actions, options will be seen in Autodesk vault right click menu.

Note: If options are not seen restart and login to Autodesk Vault client twice to see the options.



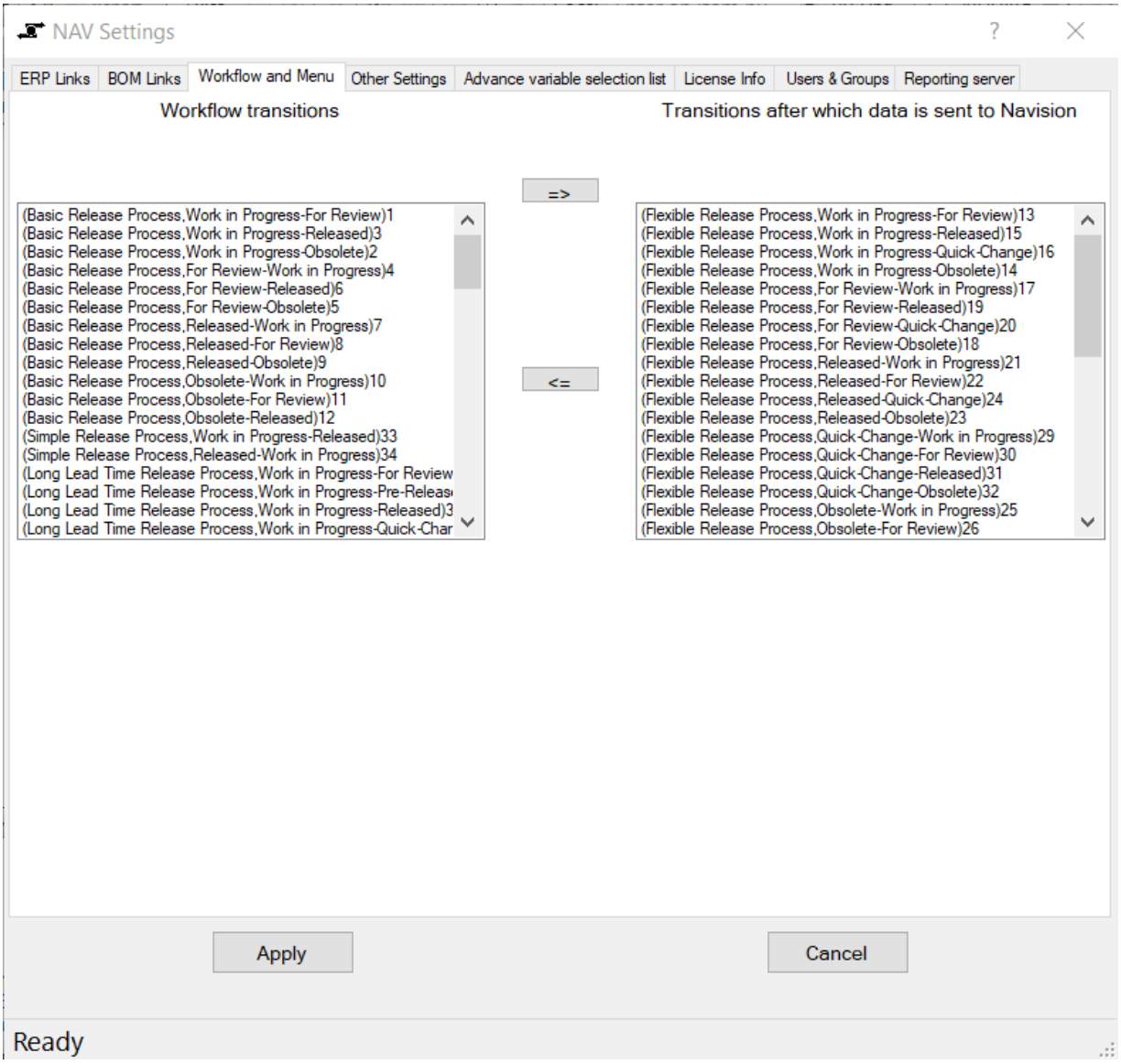
To create a new purchase or sales entity select one or more items or files (based on the “Mode” selected in settings) and click on corresponding “Create” option in the right click context menu. This will open a dialog as shown below. In the below dialog “Auto generated” means the number will be automatically generated upon creation. To add attachments, right click in “Attachment list” box and select “Add attachments”.



To add more lines to the entity, click and “Add lines” button and add more items or files. After entering required inputs click on “Create\Update” button. This will create new purchase or sales entity.

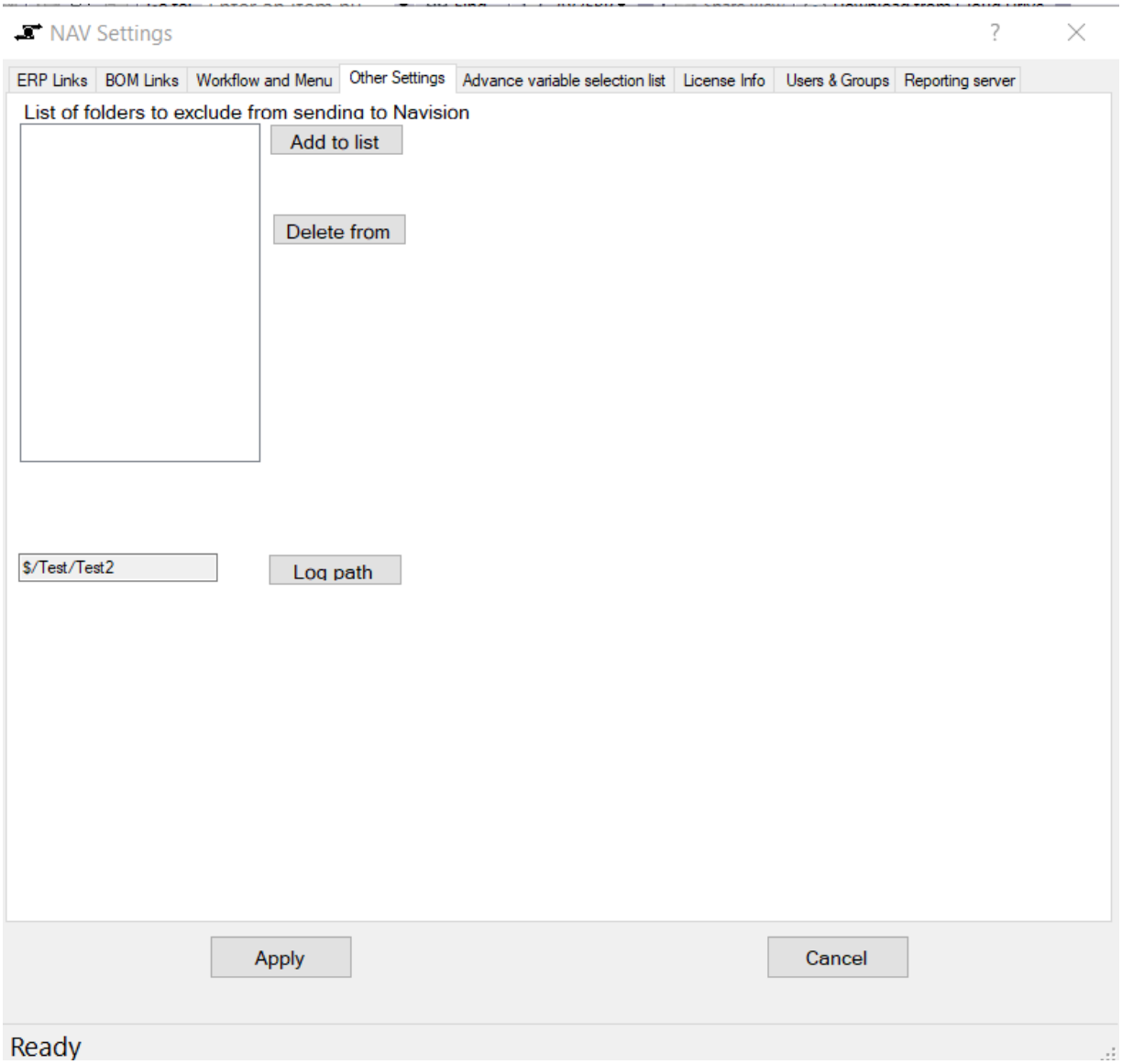
To update or view purchase and sales entities of items, select the items and click on corresponding “Update” option in right click context menu. This will open the similar dialog shown above with corresponding entities. There add or remove attachments and click on “Create\Update” button.

Workflow and Menu



In this tab select the workflow transitions after which data should be sent to Navision and choose option to show shortcut menu to send data to Navision. Select the transitions in left box and push them to right box. Post completion of transitions in right box, data is automatically sent to Navision.

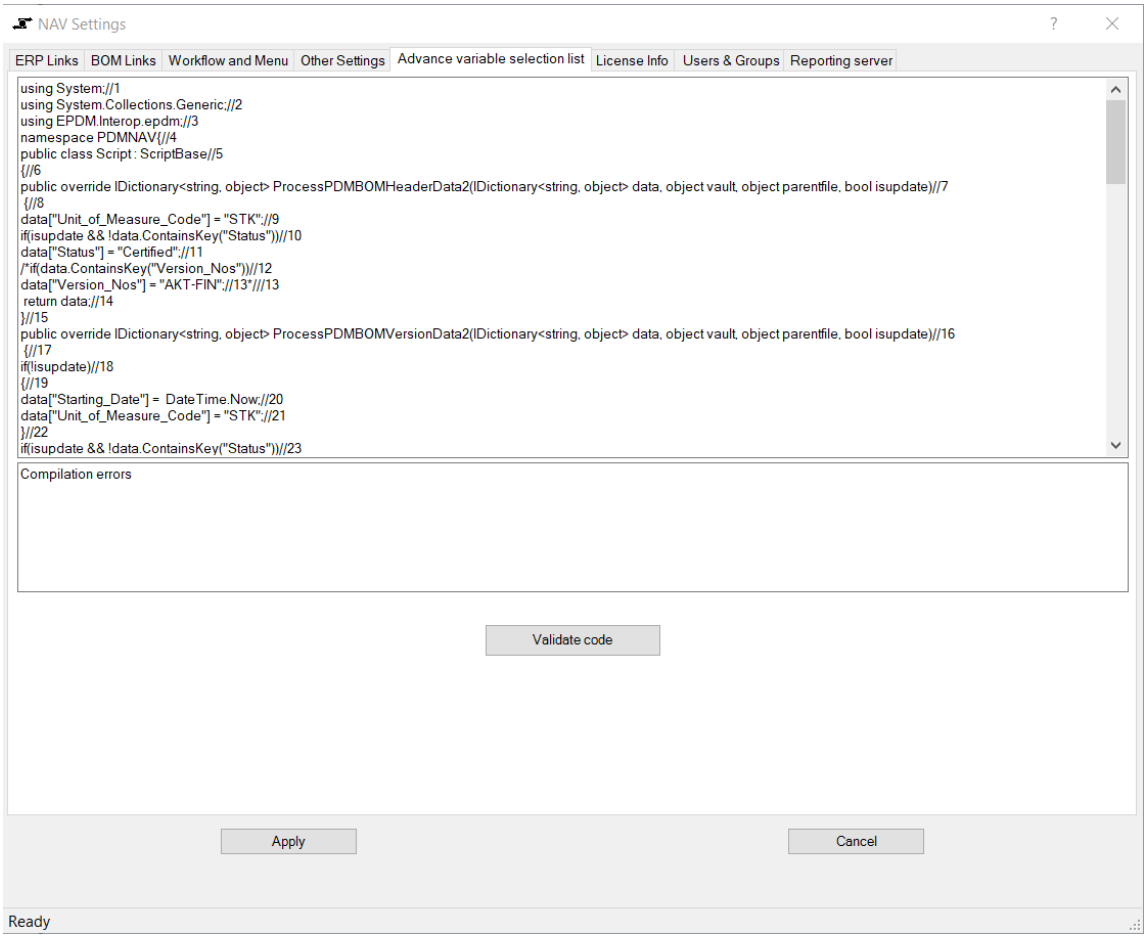
Other Settings



In this tab following options can be selected

1. Select the folders whose content should not be considered for sending to Navision. Use “Add to list” button to add folders to the list. Files in folders in this list and their subfolders will be ignored while sending data to Navision
2. In “Log path” select the folder where log files of transition should be stored

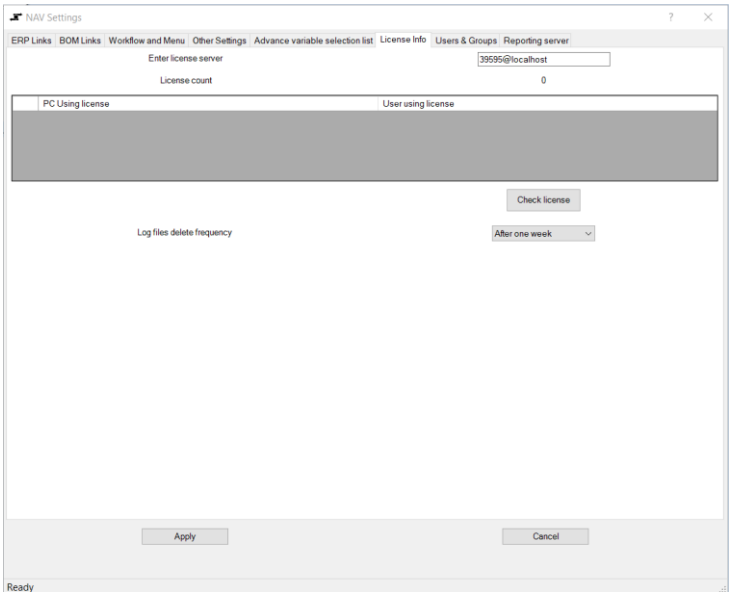
Advance variable selection list



In this tab, code can be written to process data before sending to Navision or before getting data from Navision. Syntax and template code have been given in Appendix B.

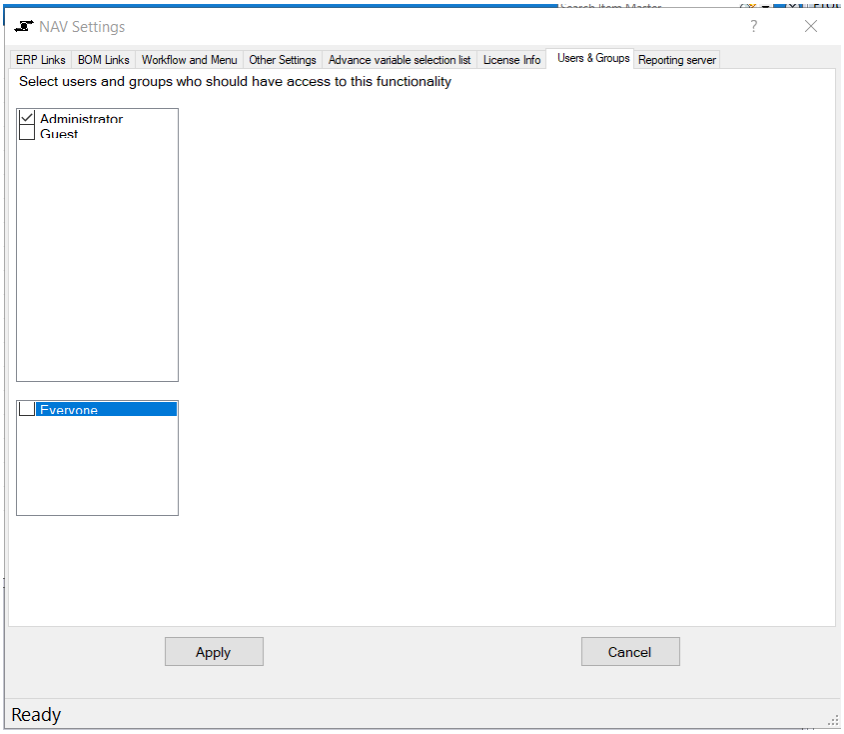
After code has been written, it can be validated by clicking “Validate Code” button. If there are any errors in the code then they can be seen in “Compile errors” section.

License Info



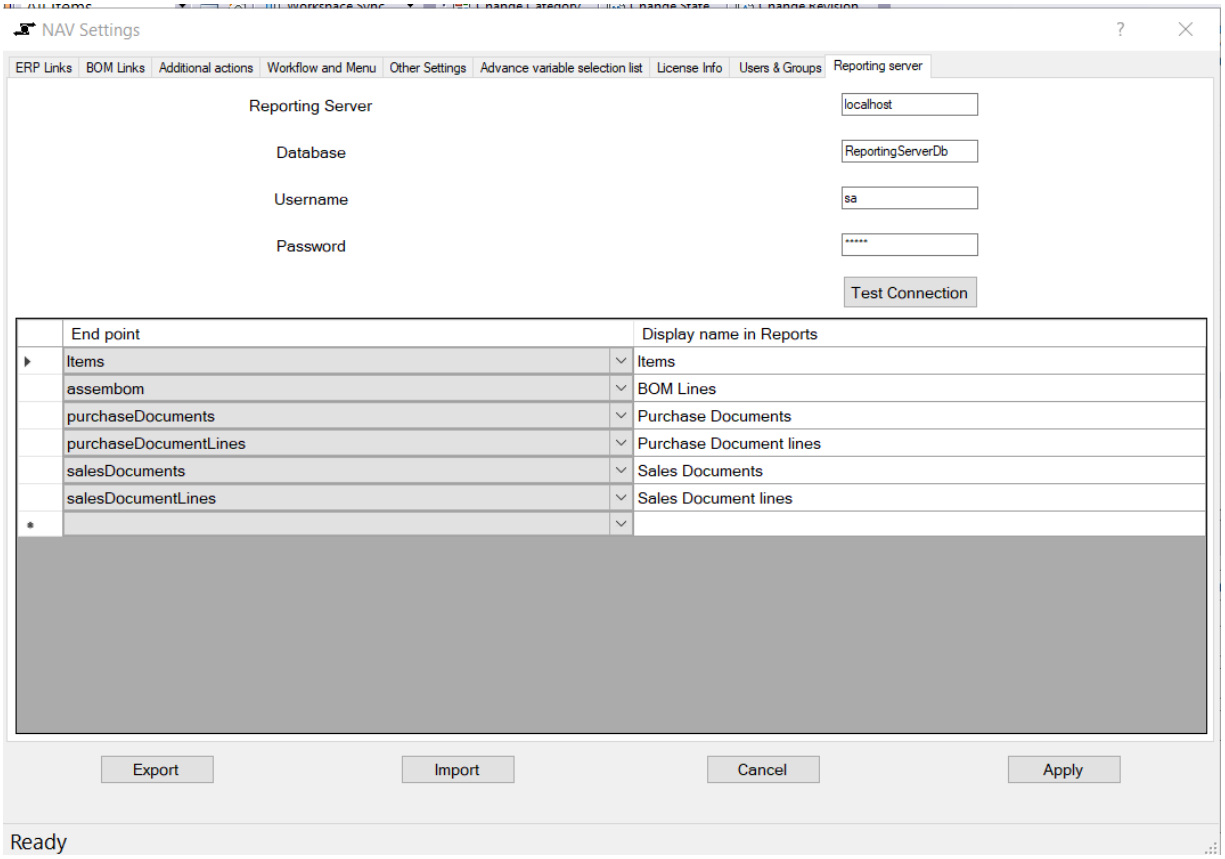
In “License Info” tab enter the name of license server. Format of input should be portnumber@licenseservername. By clicking the “Check license” one can see the total licenses, available licenses and used license information. In this tab, option when to delete old log files can also be selected.

Users & Groups



In this tab select the users\groups for whom this functionality should be available. This will allow licenses to be used only by those who want this functionality

Reporting server:



In this tab enter the details of reporting database details. This requires installation of database and additional license is required. Please contact support for setting this up.

In the table below that is below reporting server details select aliases that you want to see for different endpoints. Charts will be shown with the name of aliases.

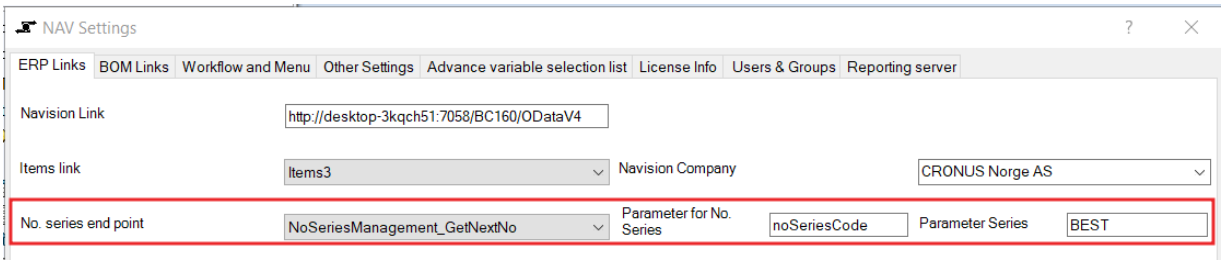
After changing the required settings click the “Apply” button to save the settings.

New Serial number from ERP:

It is possible to create items in Autodesk Vault using the serial number from “Number Series” in ERP. One of the ways is to use it is explained below.

Number series settings in settings dialog:

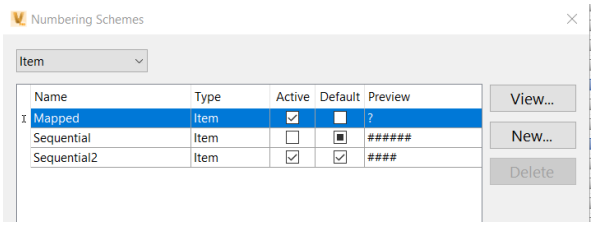
Enter required settings for “Number Series” field.



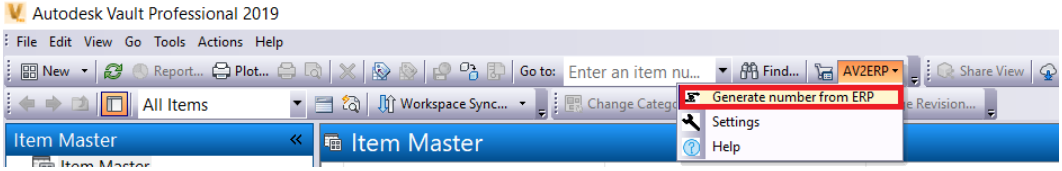
It is possible to dynamically decide which “Parameter Series” needs to be used using “`GetSeriesNoCode`” method in “Advanced variable selection list” tab in “Settings”.

Numbering Scheme:

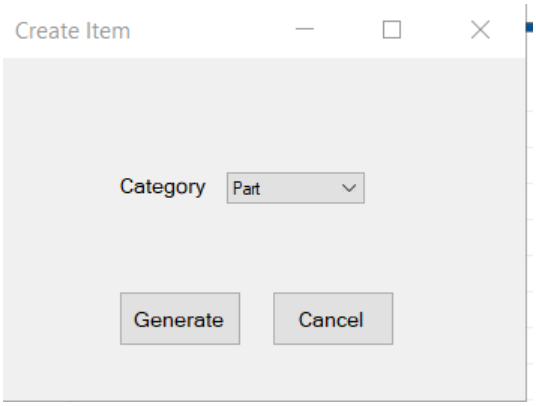
Ensure “Mapped” numbering scheme is active.



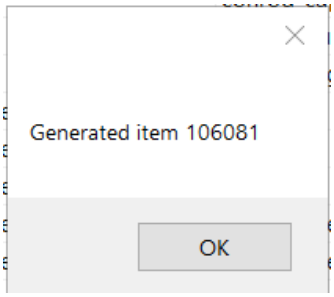
Click on “Generate number from ERP” button.



In “Create Item” dialog select category and click “Generate” button.

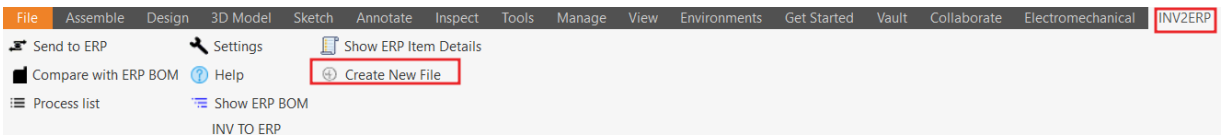


After item is generated a message box appears showing generated item number. Refresh explorer to see the newly created item.



Autodesk Inventor file from ERP number series:

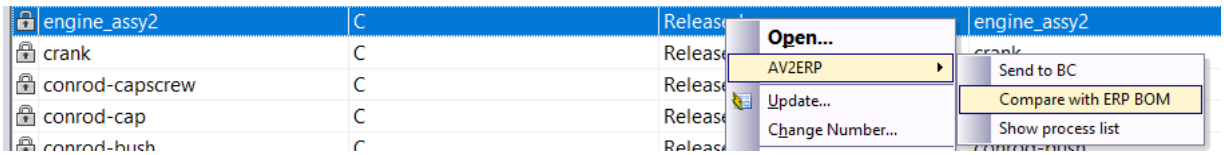
If Autodesk vault is not being used then it is possible to create Autodesk Inventor part or assembly using number from ERP number series. To do that click on below shown button



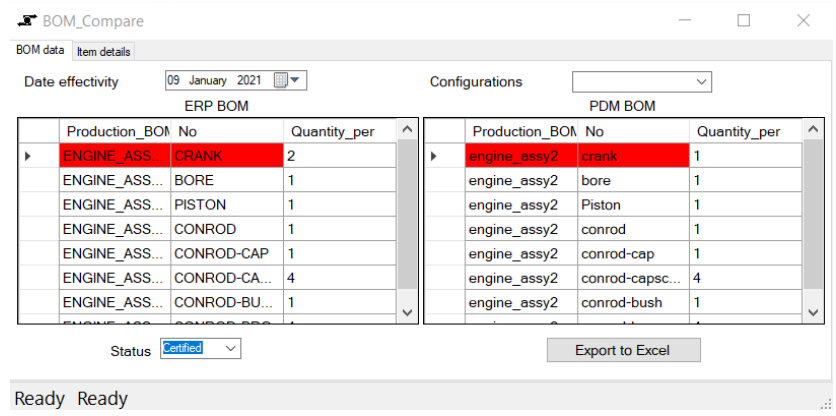
This launches new file dialog. Select required template and create the file and select output folder for the file.

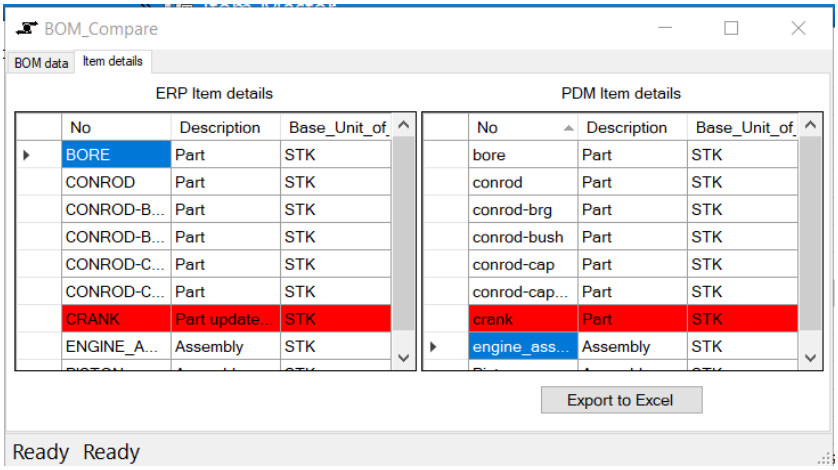
BOM Compare:

To compare Bill of Materials, right click on an assembly and click Compare with ERP BOM.



This launches BOM Compare dialog showing differences between Autodesk Vault BOM and Dynamics Navision or Dynamics Business Central. On BOM data tab one can see differences between Autodesk Vault BOM and Dynamics Business Central or Navision BOM. On Item Details tab one can see if there are any differences between Autodesk Vault item or file details and Dynamics item details. For BOM difference it is possible to choose ERP BOM based on effectivity and status if BOM Versions are being used.

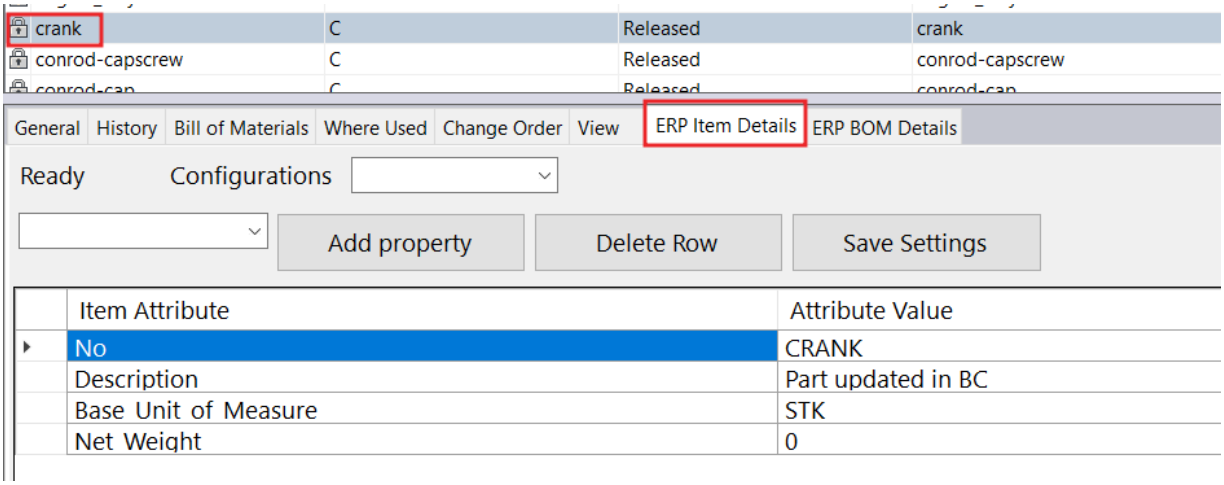




Differences are highlighted in dialog with red color. Columns used for BOM Compare are columns selected in BOM table in settings. Differences can be exported to excel file. Configuration field can be ignored.

Preview ERP Item Information data inside Autodesk Vault

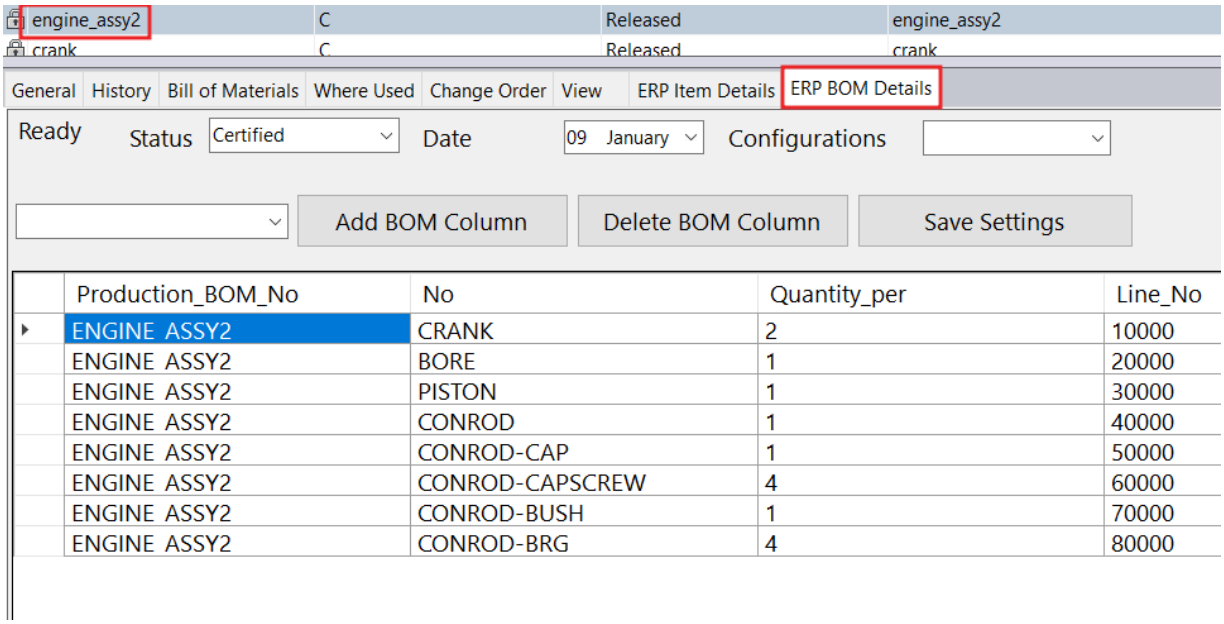
It is possible to preview product information in the product information preview tab. Select the file and activate “ERP Item Details” tab to see Dynamics Navision or Business Central data in preview tab



It is possible to customize properties that are see in this tab. Settings can be saved by "Administrator". Data see here is real time data from Dynamics Navision or Dynamics Business Central.

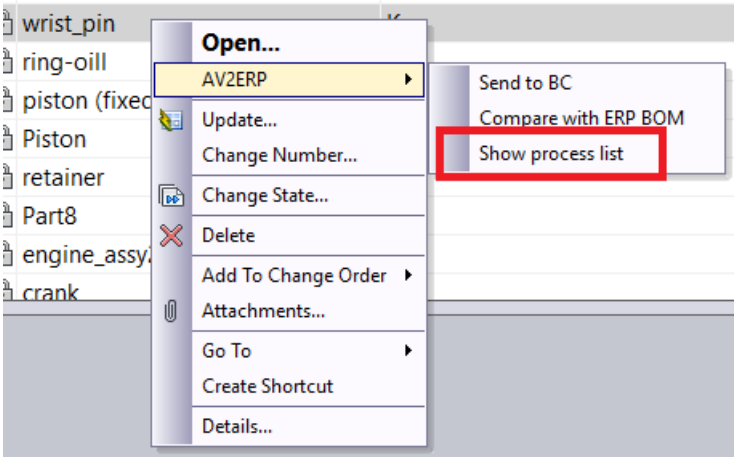
Preview ERP BOM data inside Autodesk Vault

ERP BOM can be previewed inside Autodesk Vault. BOM Columns can be added or removed. Modified BOM columns can be saved by administrator. Configuration field can be ignored. If BOM Versions are being used then it is possible to see BOM based on effectivity date and status.



Process list

To see process list, right click inside Autodesk Vault explorer and click "Show process list"



This will launch dialog showing list of processes that have been run or running in the current session. To see details of old processes, PDM2ERP Reporting application has to be used.

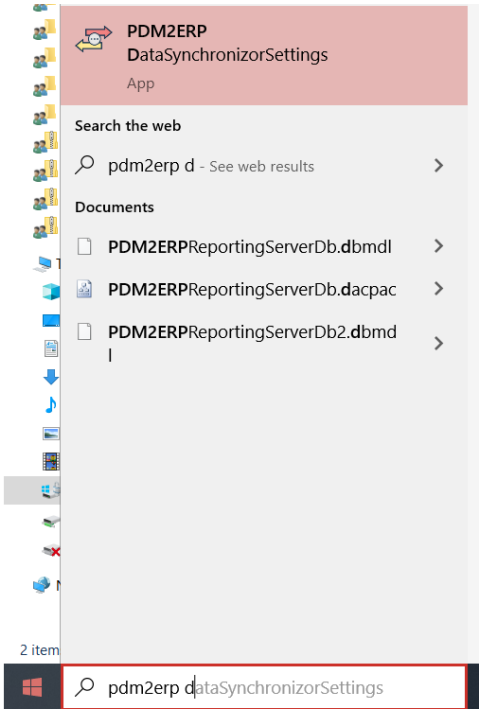
Vault Business Central Data Synchronizer:

Data Synchronizer application that is shipped with this add-in does the following tasks

1. Compares Autodesk Vault BOM with ERP BOMs that are modified after certain date silently and sends comparison results to users
2. Compares Items in Vault with items in ERP that are modified after certain date silently and sends comparison results to users.
3. Updates the Item information inside Vault if items in ERP are latest after comparion.
4. Creates missing items in Autodesk Vault from ERP

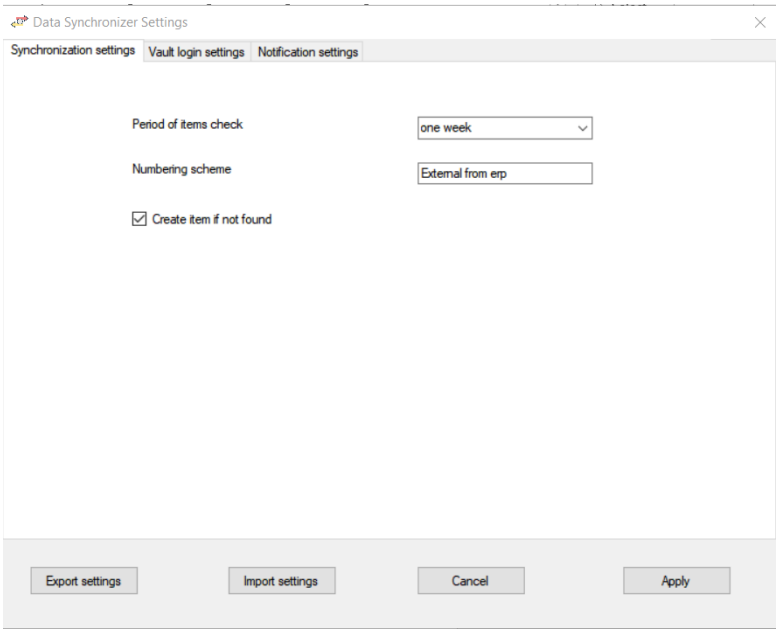
Vault Business Central Data Synchronizer settings:

To open settings dialog type «PDM2ERP D» at Windows start menu. A shortcut will be shown as shown below. Click the shortcut to open the dialog.



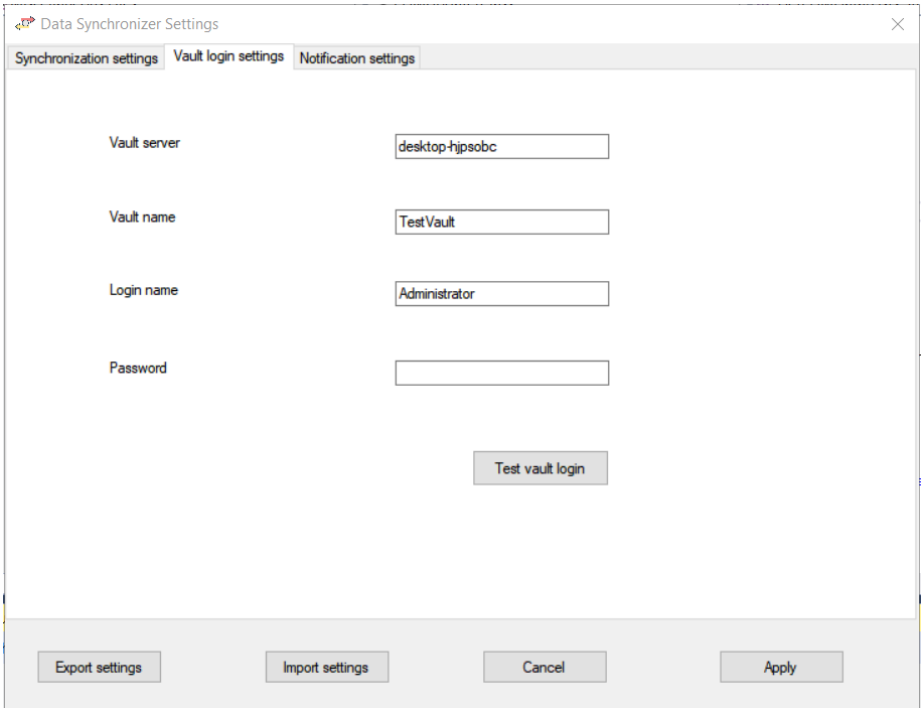
Data synchronizer settings dialog has 3 tabs.

Synchronization settings:



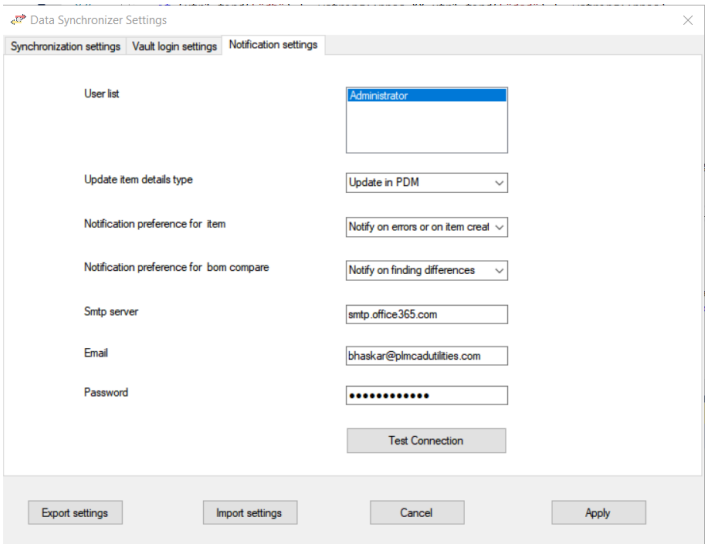
Input	Description
Period of Items check	This input is considered first time the synchronization task is executed. Date and time of execution are stored in database and from next time datetime stored in database are used to get modified items list. When synchronization is done first time then modified items in ERP are obtained based on input selected in this field. For example, if “One week” is selected then items modified during last one week in ERP are obtained. After executing synchronization task, datetime is stored in database. From second synchronization run, datetime stored in database are used.
Numbering scheme	Enter the numbering scheme that need to be used for creating new items in Vault.
Create if not found	If this checkbox is checked then items missing in Vault are created. If not checked then items not in Vault are reported by Email.

Vault login settings:



In this tab enter the login details for logging into Vault. Click the Test vault login button.
Note: After "Test vault login" button is clicked user list in "Notification settings" tab is reset. Users need to be re-selected for sending notifications.

Notification settings:



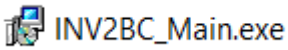
Input	Description
User list	In this list select the list of users to whom email needs to be sent.
Update item details type	Based on this input, items in Vault are updated if any differences are found from

	Business Central and if data in Business Central is latest.
Notification preference for item	Based on input selected for this field, email is sent to users upon errors in item updating or upon item creation.
Notification preference for BOM Compare	Based on the input selected for this field, email is sent to users after PDM and ERP Bill of Materials are compared.
Smtp server	Enter address of SMTP server here.
Email	Email id to login to SMTP server to send email notifications.
Password	Password to login to SMTP server to send email notifications.

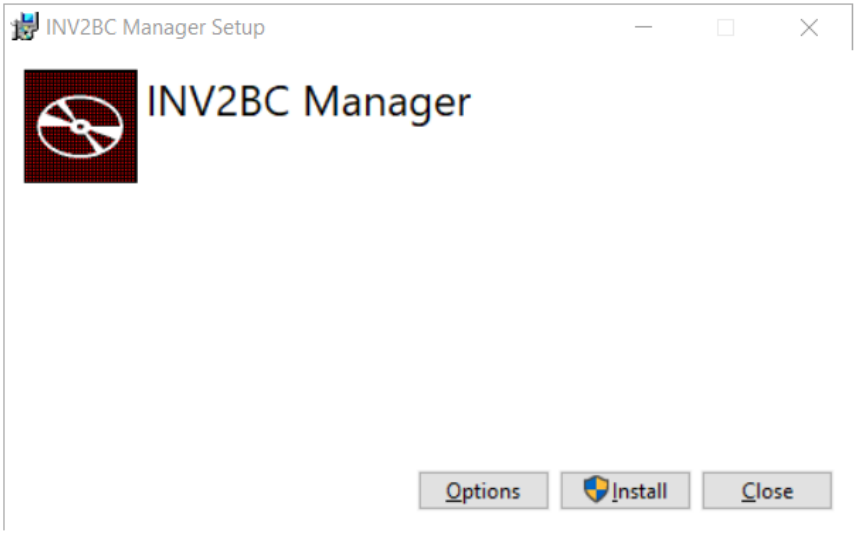
Appendix A:

Installation of Add-in

To install add-in, execute INV2BC_Main.exe.



Double clicking it opens below shown dialog. Click Install to continue with installation.



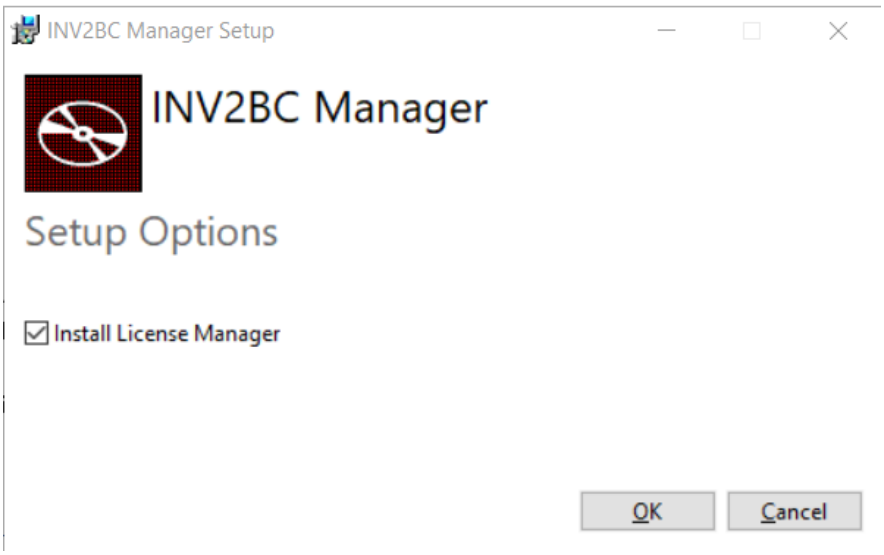
This installer installs VC redistributable if it has not been installed before. After checking and installing VC redistributable, INV2BC installer is launched. Follow the instructions in the installer to complete installation. This installs INV2BC inside folder C:\Program Files\INV2BC folder. Choose different folder if installation has to be done in different location.

After installation accept “License Agreement” before first time use. Complete the required settings as explained in Settings section.

Installation of License Server

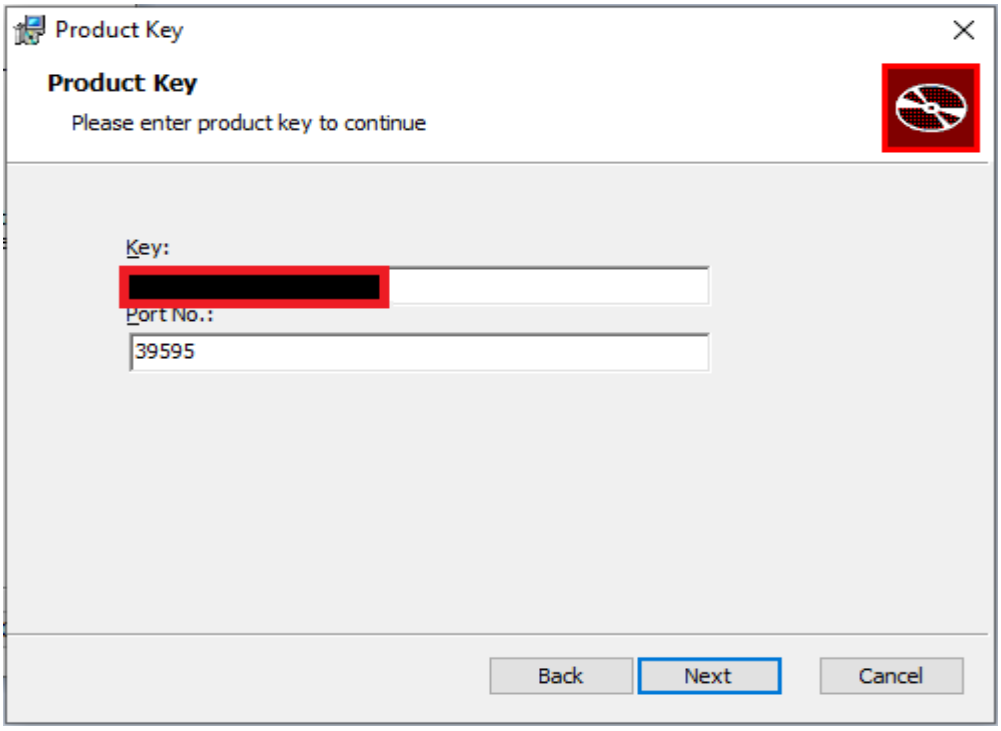
In Installer dialog click on “Options” button to open “Options” dialog.

In “Options” dialog select “Install License Manager”.

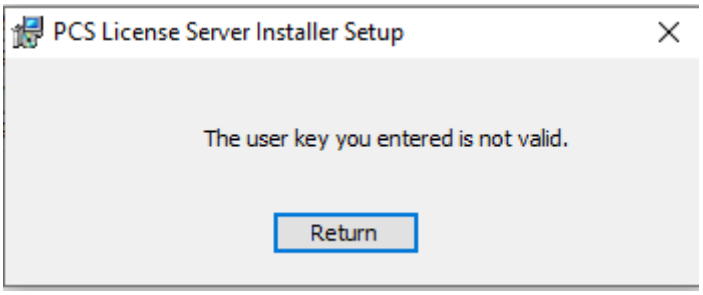


Then click on “Install”. This launches PCS License Server Installer Wizard if it is not already installed. Click “Next” in “Welcome” dialog to continue with installation. After installation license key will have to be activated.

In the next dialog enter product key and port number for License server service. Default port number is 39595

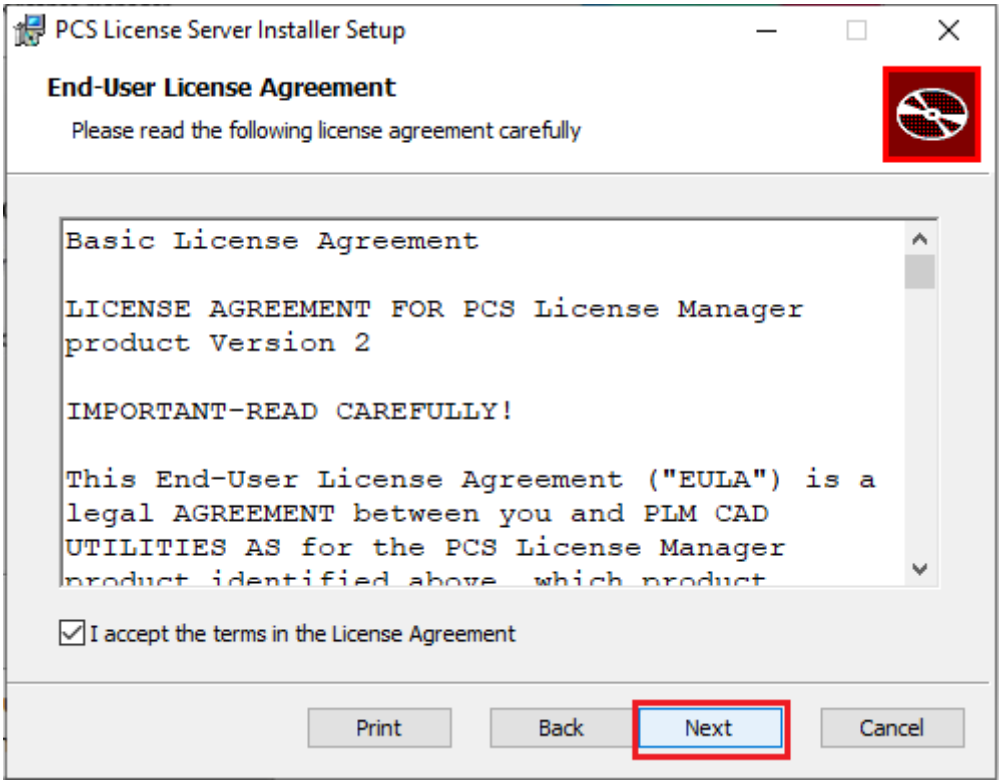


If the product key is not valid then an error message is displayed as shown below and installation will not proceed to next step

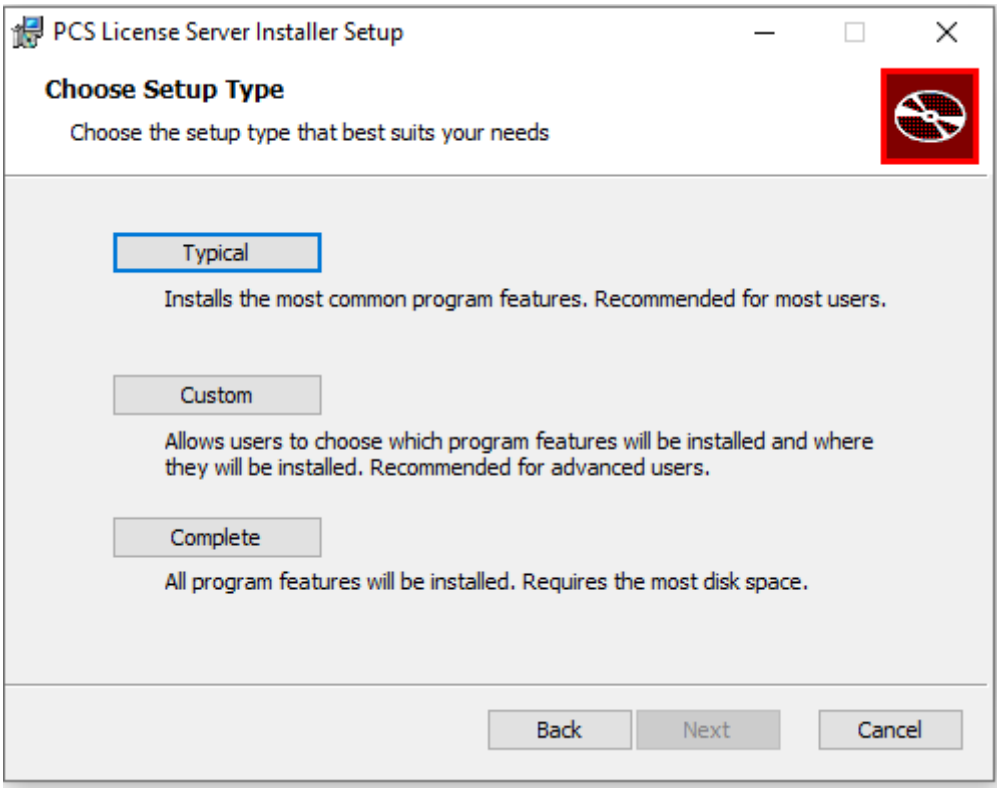


Note: Sometimes antivirus applications might block executing PCSLicenseclient.dll. If even after entering valid product, you get above error message then check antivirus application

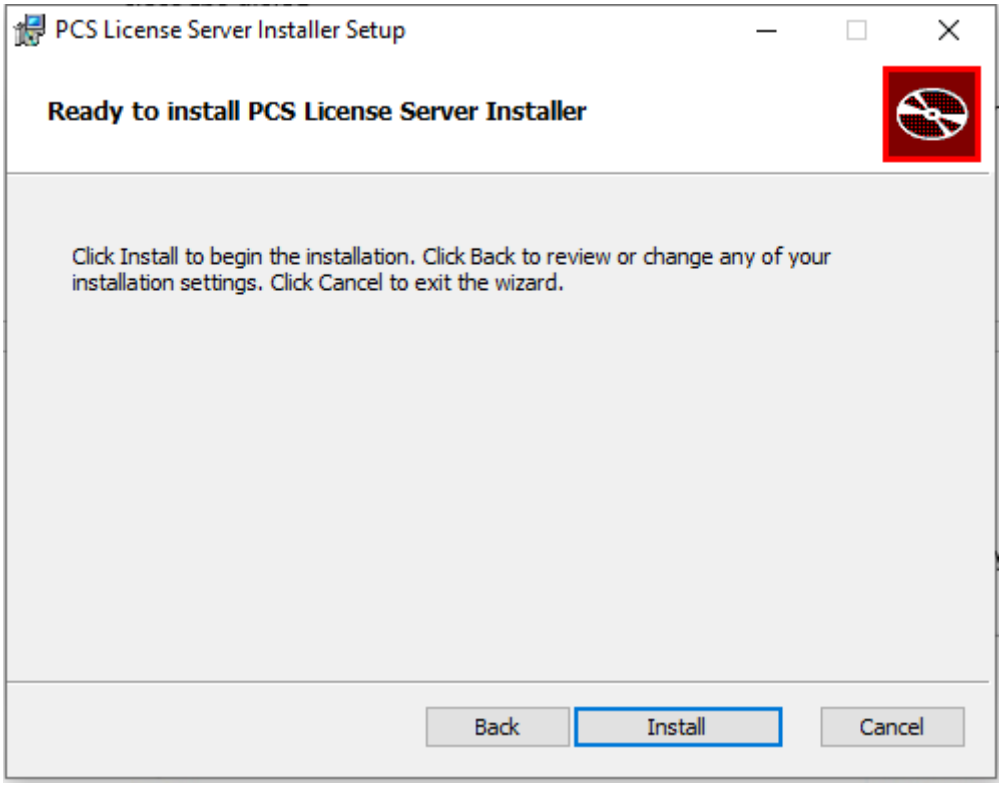
If the license key is valid, installation will proceed to next step. In the next step agree to license agreement to proceed further



After agreeing to license agreement, below dialog is shown. Default installation location is “C:\Program Files\PCSLicenseManager”. For installing in different location click on “Custom”. Else click on “Typical” or “Complete”



After all inputs are selected below dialog appears. Click “Install” to complete installation.

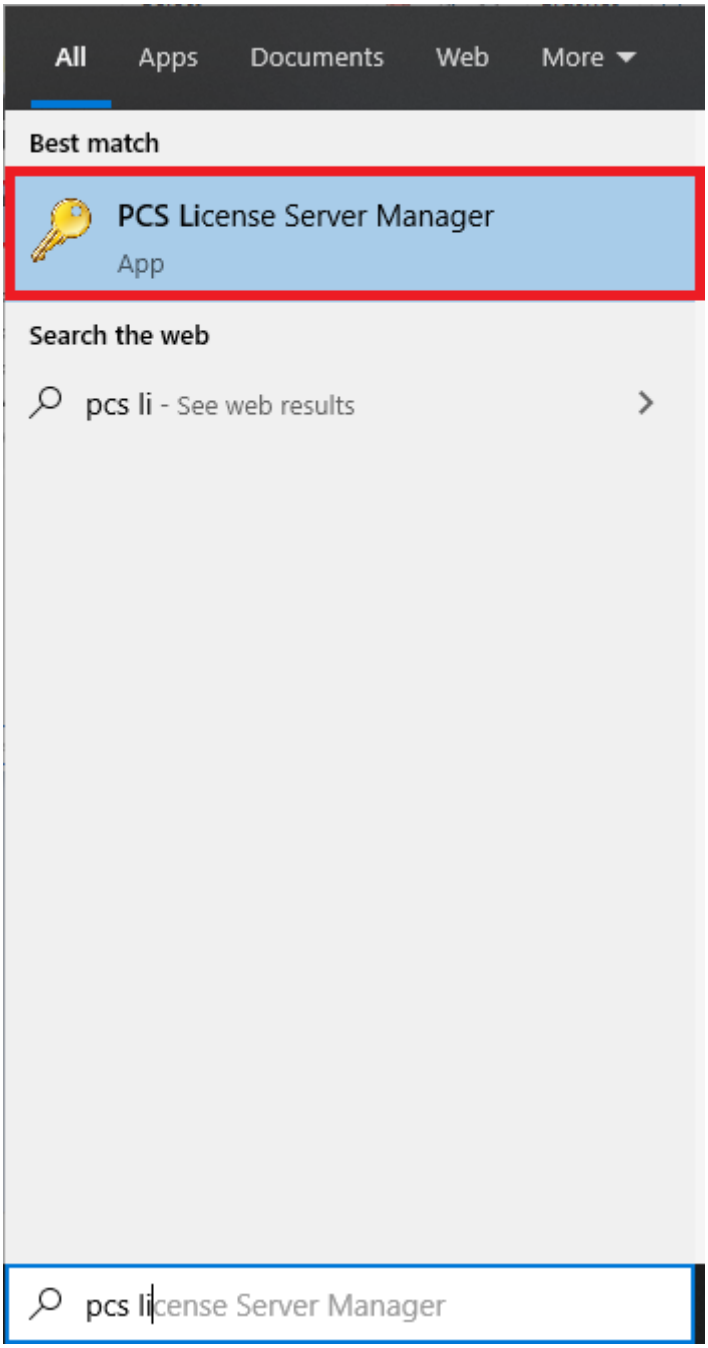


To check if license manager has been installed or not, check registry settings under HKLM\Software\PCSLicenseManager\59SG1p3r76SndQgeUVsoRg==. They should be as shown in below picture

Name	Type	Data
(Default)	REG_SZ	(value not set)
InstallLocation	REG_SZ	C:\Program Files\PCSLicenseManager\
License keys	REG_SZ	[redacted]
Port	REG_SZ	39595

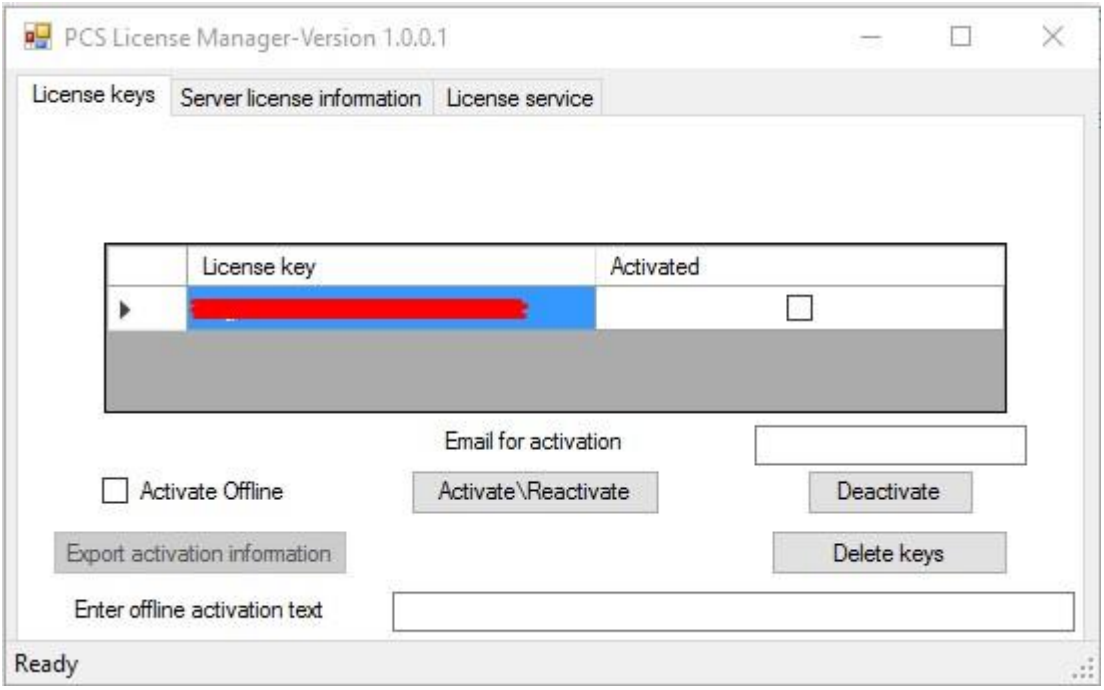
Activation of keys:

After license server has been installed, keys have to be activated. To activate keys, start “PCS License Server Manager” application. Shortcut to this application will be installed in shortcut menu



Note: To activate keys administrative permissions are required

It contains three tabs as shown in below picture



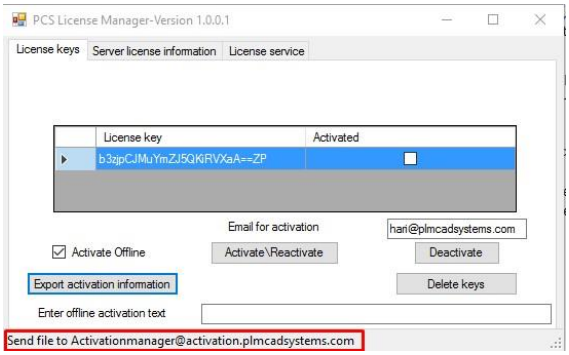
"License keys" tab contains list of license keys registered for license manager. License key information table contains information whether keys have been activated or not. To use license keys they have to be activated first. A license key can be activated on other computer after deactivating it on this computer or if more than one activations are allowed for that key. Key activation requires internet connection. If the computer is not connected to internet, keys can be activated offline.

Note: Currently deactivation is not supported offline.

To activate\deactivate keys, select the rows in the table (complete row has to be selected and not just license key column), enter email in "Email for activation" field and click activate or deactivate button.

If any error occurs during activation or deactivation, it will be shown in a dialog. A key can be activated any number of times on the same computer. This is particularly useful if license server has been uninstalled by mistake.

To activate offline, select "Activate Offline" checkbox and click on "Export activation information" button. After clicking the button, a folder browser dialog comes up. Select a folder where offline activation information has to be saved. After output folder has been selected, a text file containing information for activation will be exported and a message will be displayed in the status bar as shown below.



Appendix B:

Advanced Variable Selection:

In “Advanced Variable Selection List” tab in settings, code can be written to pre-process data before sending to Dynamics Navision or Dynamics Business Central or receiving data from Dynamics Navision or Dynamics Business Central. Below is template code. Required logic can be written inside the functions to modify attribute data before sending to Dynamics Business Central or Dynamics Navision and before receiving data into PDM. In below code ERP means Dynamics Navision or Dynamics Business Central.

```
using System;
using System.Collections.Generic;
namespace PDMNAV{
public class Script : ScriptBase
{
//This method is called just before sending data to create Production BOM. Data returned by it will be sent directly to create production bom in dynamics Navision or Business Central.
//Data contains key value pair of data that is sent to ERP. Variable “object” is of type WebServiceManager.
//Variable “parentfile” is of Item or File based, based on the mode selected, for which production BOM has to be created in ERP.
//Variable “isupdate” is true if production bom already exists in ERP for current item else false.
public override IDictionary<string, object> ProcessPDMBOMHeaderData2(IDictionary<string, object> data, object vault, object parentfile, bool isupdate)
 {
//Modify data attribute value. Example
//data["Unit_of_Measure_Code"] = "STK";
 return data;
}
//This method is called before sending data to create item in ERP. Data returned by it will be used to create item in ERP.
//Variable “file” is of type Item or File based, based on the mode selected, and holds object of file which is being created or updated.
//Variable “hasbom” will be true if file being processed has bom else its value will be false.
public override IDictionary<string,object> ProcessPDMData2(IDictionary<string,object> data,object vault,object file,bool isupdate,bool isreleaseitem,bool hasbom)
{
//Below is sample code. Remove, modify or update based on requirement.
if(hasbom)
```

```
{
data["Production_BOM_No"] = data["No"];
}
data["Base_Unit_of_Measure"] = "STK";
return data;
}
```

//This method is called for every BOM line of BOM that will be sent to Navision or Business Central. After processing BOM line one by one in this method, all BOM lines information will be passed on to ProcessPDMBOMData method.

//Variable ”parentfile” is of type Item or File based, based on the mode selected ,and holds object of parent file of currently being processed bom line.

//Variable “childfile” is of type type Item or File based, based on the mode selected ,and holds object of child file of bom line

```
public override IDictionary<string, object> ProcessPDMBOMLineData2(IDictionary<string, object> data, object vault, object parentfile,object childfile,int linenumber)
{
//Below is sample code. Remove, modify or update based on requirement.
data["Line_No"] = linenumber;
data["Type"] = "Item";
return data;
}
```

//This method is called before sending BOM information to Dynamics Navision or Business Central to create BOM. Data returned by it will be sent to Dynamics Navision or Business Central to create BOM.

//Variable ”parentfile” is of type type Item or File based, based on the mode selected ,and holds object of parent file of currently being processed bom.

//Variable “childfile” holds list of IEDMFile5 objects of all children

```
public override List<IDictionary<string, object>> ProcessPDMBOMData(List<IDictionary<string, object>> data, object vault, object parentfile, List<object> childfile)
{
    return data;
}
```

//This method is called before sending information to create BOM version in Dynamics Navision or Business Central. Data returned by this function is used to create Production BOM Version in Dynamics Navision or Business Central.

```
public override IDictionary<string, object> ProcessPDMBOMVersionData2(IDictionary<string, object> data, object vault, object parentfile, bool isupdate)//14
 {
if(!isupdate)
```

```
data["Starting_Date"] =  DateTime.Now;
if(isupdate)
data["Status"] = "Certified";
 return data;
}
```

//This function is called to get custom value of version number if version number is neither a PDM variable nor <ERPSERIAL>.

//object file is the assembly that is being processed and itemid is the key pdm column value

```
public override string GetBOMVersionNameCustomvalue(object file, string itemid)
    {
       return "";
    }
```

//If any custom status value is used for BOM preview or for BOM compare other than the 4 available statuses for BOM version then this function should return the required status name. It should also return ERP attribute that stores status variable.

```
public override string GetStatusForBOMVersionFilter(ref string statusvar)
    {
       statusvar = "Status";
       return "Certified";
    }
```

//In case of template card inputs will be null or empty other than defaultcode and vault object. If serial number is for file data card then file will be of type Item or File based, based on the mode selected , filepath will be full file path, configuration is active configuration. “defaultcode” will be the number series name entered in “Settings” dialog

```
public virtual string GetSeriesNoCode(object file,string filepath,object vault,string configuration,string defaultcode)
    {
       return defaultcode;
    }
}
}
```