

SD500011

Share Your Bill of Materials: Connecting PDM, PLM, and ERP

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COOLORANGE

Learning Objectives

- Explore the different forms of a BOM in CAD, PDM, PLM, and ERP, and learn how different departments use them
- Learn about the concepts of sharing BOM data between CAD, PDM, PLM, and ERP
- Discover the tools and APIs available to share BOM data between Inventor, Vault, Fusion 360 Manage, and ERP
- Explore a sample implementation that shares a BOM between Vault, Fusion 360 Manage, and ERP

Description

Bills of materials (BOMs) serve several purposes throughout a product lifecycle. While BOM data is usually created by CAD designers and managed in product data management (PDM) systems such as Vault software, it also needs to be shared with departments outside engineering where BOM information is used for production planning, assembling, or purchasing. Each of these steps requires a different view of the same BOM. Sometimes BOMs even need to be extended with information such as "work stages" or "work orders." Sharing and enriching BOM information is usually done in systems other than Vault, such as Fusion 360 Manage or enterprise resource planning (ERP) systems. This class will explore bills of materials and their different uses. We'll showcase different ways to share BOM data among product lifecycle management (PLM) systems, PDM systems, and ERP systems. And we'll analyze the available APIs to help you implement BOM workflows among Vault Professional (PDM), Fusion 360 Manage (PLM), and ERP systems.

Speaker

Christian Gessner is a co-founder and Technical Evangelist at COOLORANGE. In this role, he helps customers and resellers to use the right technology and tools to successfully design, implement and customize Autodesk PDM and PLM solutions. He has over 15 years of experience in software development with a focus on Autodesk data management products and Microsoft development technologies. Prior to COOLORANGE, Christian was member of the data management software engineering team at Autodesk.

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Preamble

The Autodesk University class “Share Your Bill of Materials: Connecting PDM, PLM, and ERP” shows that Bill of Material data needs to be analyzed and that different components can be involved to integrate and exchange data between Vault, Fusion 360 Manage and ERP systems.

Since this is quite a diverse topic and 30 to 45 minutes are far from enough to deeply analyze the topic – and because every manufacturing company’s BOMs and IT ecosystems looks slightly different – this document is meant to be a compilation of links and information for you to start your own investigation.

At COOLORANGE we build automations and integrations on a daily base and are more than happy to talk to you about your specific needs. If you want to reach out, don’t hesitate to send an email to sales@coolorange.com or contact me directly at christian.gessner@coolorange.com

If you are a programmer and capable of using the various technologies mentioned in the class and down below, you can use the links in this document to build your own interfaces.

As stressed in the class, it’s finally time to consider our product data to be a single data foundation and to use the available technologies to integrate the different systems that all stakeholders can get the best out of the most important intellectual properties of each manufacturing company – the product data.

Thanks,
Christian



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Bill of Materials

Books

Manufacturing Data Structures: Building Foundations for Excellence with Bills of Materials and Process Information

by Jerry Clement, Andy Coldrick, John Sari

ISBN-13

978-0471132691

ISBN-10

0471132691

AU Classes

Managing Bills of Materials: The Recipe for Your Product Design

Author

Brian Schanen

Description

Your bill of materials (BOM) is the DNA of your product—how are you managing it? It's OK if you say Microsoft Excel—we can meet you where you are. In this session, you will learn about the proper care and feeding of your BOM, how to prevent using the wrong vendor to source your components, the evolution of the BOM, comparison and markup—what's changed, and how to see the history. The past, present, and future of your product's bill of materials.

Link

<https://www.autodesk.com/autodesk-university/class/Managing-Bills-Materials-Recipe-Your-Product-Design-2020>

BOM transforming: Align Engineering and Manufacturing Bill of Materials

Author

Sven Dickmans

Description

Deriving a product design into a manufacturing process is a continuous challenge. Catching up with latest design changes often times is a manual, error prone and slow process performed in the ERP system. With the Vault PLM solution offering, this process can be vastly improved as both the Engineering BOM and the Manufacturing BOM are accessible and linked in a single system. Workflow mechanism ensure that data being received from engineering gets transitioned properly & extended to define manufacturing processes. The resulting manufacturing then gets published to ERP upon approval of Manufacturing Change Orders.

In this session you will see how this process is managed in an integrated environment. A custom built, smart editor will be used to automate this process as much as possible and to provide visual indicators to ensure a proper alignment of structures in an easy way.

Link

<https://www.autodesk.com/autodesk-university/class/BOM-transforming-Align-Engineering-and-Manufacturing-Bill-Materials-2021>

Vault - Fusion 360 Manage Connector

Links

powerPLM

Documentation: <https://doc.coolorange.com/doku.php?id=powerflc>

Product information: <https://www.coolorange.com/products/powerplm/>

powerJobs Processor

Documentation: https://doc.coolorange.com/doku.php?id=powerjobs_processor

Product information: <https://www.coolorange.com/products/powerjobs/>

AU Classes

Joint Effort: Vault and Fusion Lifecycle As the New Dream Couple

Author

Christian Gessner

Description

When used together, Vault Professional software and Fusion Lifecycle software provide a combined solution that is the best of all worlds for product data management (PDM) and product lifecycle management (PLM). While Vault runs on-prem to keep your CAD data safe behind your firewall, Fusion Lifecycle is cloud-based for flexibility and ease of deployment. With powerFLC (Vault Fusion Lifecycle connector), coolOrange offers an easy-to-use and flexible tool to combine Fusion Lifecycle and Vault processes. Previous versions of powerFLC included predefined workflows, and with the latest version of powerFLC, it is even possible to create custom workflows to synchronize any data between Vault and Fusion Lifecycle. This class will demonstrate the advantages of using both products together and show some of the endless possibilities of this integration.

Link

<https://www.autodesk.com/autodesk-university/class/Joint-Effort-Vault-and-Fusion-Lifecycle-New-Dream-Couple-2020>

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PDM and PLM United: Vault Fusion Lifecycle Connector – a Zero-Code Connector

Author

Christian Gessner

Description

When used together, Vault Professional software and Fusion Lifecycle software provide a combined solution that is the best of all worlds for product data management (PDM) and product lifecycle management (PLM). While Vault runs on-premises to keep your CAD data safe behind your firewall, Fusion Lifecycle is cloud based for flexibility and ease of deployment. Sadly, this has made a seamless integration between the two difficult—until now. This class describes the benefits of the Vault Fusion Lifecycle Connector, including installation, configuration, and extensibility, so you can create a best-of-all-worlds solution.

Link

<https://www.autodesk.com/autodesk-university/class/PDM-and-PLM-United-Vault-Fusion-Lifecycle-Connector-Zero-Code-Connector-2019>

Bring It All Together: The Fusion Between PDM and PLM

Author

Peter Van Avondt

Description

Vault product data management (PDM) software helps designers and engineers better organize design data, enhance documentation management, and streamline revision processes of their product data. Product data is not exclusively used by development teams but should also be available outside the engineering department. On the other hand, the engineers require data from upstream processes such as sales orders and specifications. And that's where a product lifecycle management (PLM) system like Fusion Lifecycle software comes into the play. Fusion Lifecycle serves as a company-wide information source for activities before, during, and after development actions, supported by automated processes. In this class, we will have a look at how both worlds (PDM and PLM) can be tied together to streamline the workflows throughout the whole product development cycle.

Link

<https://www.autodesk.com/autodesk-university/class/Bring-It-All-Together-Fusion-Between-PDM-and-PLM-2019>

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Vault - ERP Connector

Links

powerGate

Documentation: <https://doc.coolorange.com/doku.php?id=powergateserver>

Product information: <https://www.coolorange.com/products/powergate/>

AU Classes

Connect Vault with ERP: Items, Bills of Materials, Files, and More

Author

Marco Mirandola

Description

Connecting engineering (Vault software) with purchase (ERP: Enterprise Resource Planning) is a mandatory step. Nowadays, technology helps, as most ERP systems provide APIs or the like. This session will show you how Vault and ERP can be connected in a direct way, so operations are immediate, data is kept just once (no data redundancy), and users know right away whether the action was successful or not. You will see a live integration between Vault and Microsoft Dynamics NAV, and we will also talk about other ERP systems like SAP, and others.

Link

<https://www.autodesk.com/autodesk-university/class/Connect-Vault-ERP-Items-Bills-Materials-Files-and-More-2018>

Cloud and Desktop – the Best of Both Worlds

Authors

Marco Mirandola, Klaus Loerincz

Description

The Autodesk Forge platform delivers brilliant technologies that enhances the daily work also in the desktop world. This session will explain and show how to benefit from the forge APIs within your desktop environment with practical, real examples. See how to use the Forge Viewer within Vault, or how to leverage the Design Automation API with your local files, how to use the Data Management and Derivative API. This session will explain how Cloud and Desktop can work together today, with practical examples and so give you new ideas for your business. (Joint AU/Forge DevCon class).

Link

<https://www.autodesk.com/autodesk-university/class/Cloud-and-Desktop-Best-Both-Worlds-2017>

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Vault API

Tools

powerVault

powerVault hides the complex Vault API by wrapping it in simple Windows PowerShell Cmdlets, allowing anyone with little scripting skills to create custom code.

Documentation: <https://doc.coolorange.com/doku.php?id=powervault>

Product information: <https://www.coolorange.com/products/powervault/>

AU Classes

Feel the Power Between Vault and PowerShell

Authors

Jeffrey Fishman, Markus Koechl

Description

The Vault client in itself is a powerful data utility, but just imagine there's so much more that can be done with the Vault software development kit (SDK) software. Learn how to use the versatility and flexibility of Microsoft PowerShell, and bring your logic to new levels of automation. Learn how to instantiate Vault objects, call Vault Web Service methods, and manipulate the data stored within Vault in a lightweight scripted .NET language.

Link

<https://www.autodesk.com/autodesk-university/class/Feel-Power-Between-Vault-and-PowerShell-2019>

API Enhancements in Vault 2019

Author

Paul Gunn

Description

This class will cover new API functionality in Vault 2019 software. This functionality was added to support the Project Sync feature, but was designed to be used by any client-side Vault customization. Topics include entity attributes (which can associate additional data with any Vault object), scheduled jobs (which allow execution of custom jobs at a given time and cadence), and more.

Link

<https://www.autodesk.com/autodesk-university/class/API-Enhancements-Vault-2019-2018>

Vault Extensions Snorkeling – First Touch to Vault Extension and Automation Programming

Authors

Markus Koechl, Christian Gessner

Description

Vault data management software isn't just a single program; it's a framework, composed of many pieces like CAD add-in or Vault Explorer (Client) working together. You can customize some of these pieces and not others. This class will discuss the various ways to customize and integrate with Vault, including Vault Data Standard advanced scripting layer and Vault application programming interface. Following samples of standalone applications interacting with Vault, jobs automating repetitive tasks, or event handlers extending workflows, you can get started scripting and coding your own first extensions.

Link

<https://www.autodesk.com/autodesk-university/class/Vault-Extensions-Snorkeling-First-Touch-Vault-Extension-and-Automation-Programming-2017>

Vault Extensions Deep Dive – Explore Vault Extension and Automation Programming

Authors

Christian Gessner, Markus Koechl

Description

Vault data management software isn't just a single program; it's a framework, composed of many pieces like CAD add-in or Vault Explorer (Client) working together. Some of these pieces are customizable and some are not. This class will discuss the different capabilities of the Vault API, in particular, details of Vault Explorer extensions, custom jobs, and custom event handlers-including aspects like debugging, security, and other sophisticated topics.

Link

<https://www.autodesk.com/autodesk-university/class/Vault-Extensions-Deep-Dive-Explore-Vault-Extension-and-Automation-Programming-2017>

Programming Item BOMs Through the Vault API

Author

Doug Redmond

Description

Vault Professional 2015 software introduces many exciting new features for working with bill of materials (BOM) data. On top of that, Vault Professional 2015 software R2 adds even more BOM features. This class will go over those features at an API (application programming interface) level, and we will also go over what has changed. The new features have made the old APIs incompatible. If you're upgrading your app from an earlier version of Vault software, this class will give you advice about needed code changes.

Link

<https://www.autodesk.com/autodesk-university/class/Programming-Item-BOMs-Through-Vault-API-2014>

Fusion 360 Manage API

Webhooks

Webhooks are simple HTTP callbacks used to provide event notifications.

Webhooks are triggered whenever an item is created, updated, or cloned in a specific workspace in Fusion 360 Manage. Once triggered, the information about the item, its URN and descriptor, is sent to an external app for further processing.

<https://help.autodesk.com/view/PLM/ENU/?guid=WH-WEBHOOK-INTRO>

Zapier

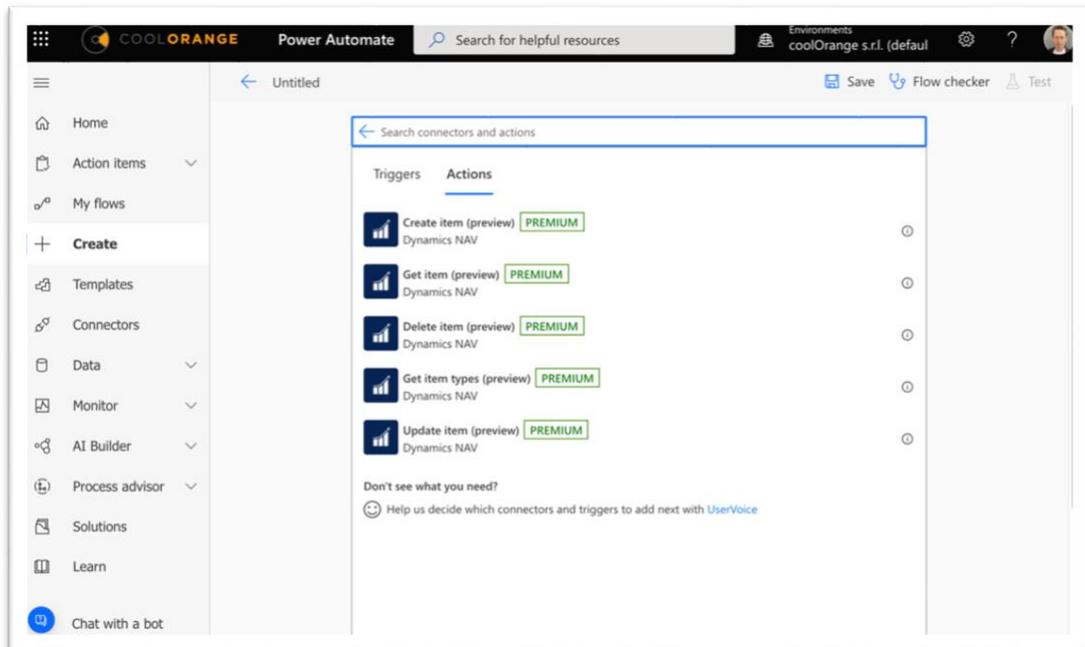
Zapier is a product that allows end users to integrate the web applications they use. It can be used to receive Fusion 360 Manage webhooks. Autodesk provides a step-by-step tutorial that demonstrates how a webhook can be received and the owner of the item be notified by email:

<https://help.autodesk.com/view/PLM/ENU/?guid=WH-TUT2-ACT1>

<https://zapier.com/>

Microsoft Power Automate

Microsoft Power Automate allows to receive webhooks. It also has out-of-the-box connectors to Microsoft's ERP system Dynamics NAV

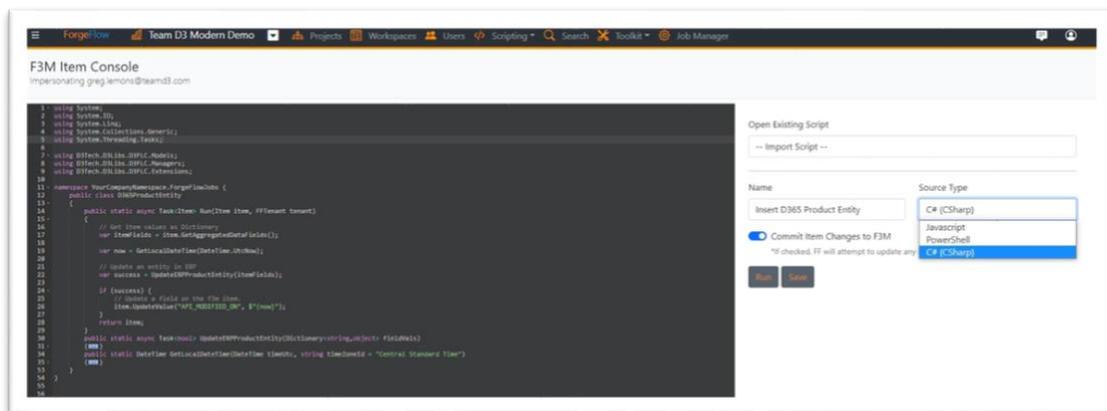
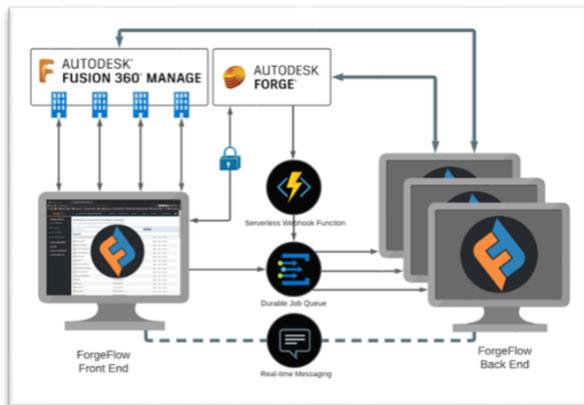


<https://powerautomate.microsoft.com/en-au/>

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D3 ForgeFlow

ForgeFlow by D3 Technologies is a web-based platform that allows to receive Fusion 360 Manage webhooks and execute custom code, either in JavaScript, C#, or PowerShell whenever a webhook is received. This allows to send data to ERP systems or to manipulate/enrich data in Fusion 360 Manage.



<https://www.teamd3.com/>

REST API

A RESTful API is an architectural style for an application program interface (API) that uses HTTP requests to access and use data. That data can be used to GET, PUT, POST and DELETE data types, which refers to the reading, updating, creating, and deleting of operations concerning resources.

The Fusion 360 Manage API is built on REST using resource-oriented URLs and HTTP features such as HTTP methods and HTTP response codes.

https://help.autodesk.com/view/PLM/ENU/?guid=FLC_RestAPI_Read_Me_First_html

AU Classes

Power Up Your Integration with Fusion Lifecycle Using the New v3 API

Authors

Giliar de Fries Perez, Igor Cunko

Description

Understand how you can capitalize on the new v3 API in Fusion Lifecycle software to power up your integration or custom application. This class will cover the new authentication system using the Forge platform to generate proper authentication tokens for Fusion Lifecycle; best practices in regards to security; how the API is structured (payload structure, REST verbs, links, collections); general best practices; and other tips and tricks. Learn how to capitalize on impersonation and different security contexts for your users. By the end of this class, you should be able to use a third-party integration to automatically perform a simple workflow in Fusion Lifecycle using just the v3 API. The class requires some experience writing basic integrations, and it will involve Fusion Lifecycle, the Forge platform, and a third-party integration/automation tool such as Zapier or IFTTT (If This, Then That).

Link

<https://www.autodesk.com/autodesk-university/class/Power-Your-Integration-Fusion-Lifecycle-Using-New-v3-API-2018>

Smart Workflow: Adding Business Logic to Your Fusion Lifecycle Workflows with Scripting

Authors

Michael Vesperman, Fred Smith, Vahid Zohrehvandi

Description

This class will review how your company can achieve true process improvement by methodically analyzing your As-Is process, and identifying redundant steps, bottlenecks, missed activities, and so on. Design a streamlined To-Be process that incorporates decision-making automation of business logic, and enable Fusion Lifecycle software to manage your logic-driven process. This class will be a technical review covering the Fusion Lifecycle application scripting frameworks and API. We will expose students to workspace modeling and scripting techniques that will enable them to automate and streamline their product lifecycle management workflows. This session features PLM 360 (now Fusion Lifecycle) and Fusion Lifecycle.

Link

<https://www.autodesk.com/autodesk-university/class/Smart-Workflow-Adding-Business-Logic-Your-Fusion-Lifecycle-Workflows-Scripting-2016>