There Is an Easier Way to Do That: Lessons Learned in Three Years of Forge Dev

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Civil and Software Engineer | @tabalmeida

Raphael Rodrigues
Software Developer | @rodriguesrl
About the speaker

Thiago Almeida

- Civil Engineer
- Software Engineer
- Several Autodesk Certifications
- CTO on Shedmate
- ADN Member
About the co-speaker

Raphael Rodrigues

• Full-stack Developer
• Desktop, Web and Mobile development
• Focus on Forge and Revit
• ADN Member
Intro
Check out our hands-on lab

SD468797-L - The Cross-Platform Revit: Sharing Code with Plug-Ins, Dynamo, and Forge
Learn Objectives

• Learn how to create inclusive AECO solutions with collaboration in mind.
• Learn how to use your existing code base to power up the creation of cloud-based solutions.
• Learn how Forge can be used to deliver high-quality, feature-rich applications with less effort.
• Discover lessons learned from taking existing desktop applications to the cloud.
Know when it’s time to change to the cloud
Advantages of Cloud Applications

• Easy to use environment for the end users.
• Take advantage of mobile devices.
• Better data interaction and availability.
• Prebuilt infrastructure and maintenance.
• Controlled development environment.
• New business opportunities.
• Security.
Disadvantages of Cloud Applications

- Security.
- Regulations.
- The change can be overwhelming.
- Investments to port existing applications.
- Latency and Internet Speeds.
- Needs a multi-disciplinary team.
Experience using Forge

- Great support.
- Small but growing community.
- Very well documented.
- Abundant training resources.
- You need to try things by yourself.
Tour of the Forge API
Authentication

The entrance door to Forge

- Model Derivative API
- Data Management API
- Design Automation API
- BIM 360 API
2 Legged Authentication

Communication happens between the Application and the Forge Servers.
3 Legged Authentication

User also participate on the communication.

Your User  →  Your Server  ↔  Forge
Demo
Data Management API

Allows the developers to manage and control data across all Autodesk’s cloud products.

- Centralized and consistent way to move data back and forth.
- Access to the Object Storage Service.
Model Derivative API

Used to handle File Translations and Metadata Extractions.

- Translation.
- Thumbnails.
- Geometry Extraction.
- Metadata Extraction.
Forge Viewer API

Used to embed a 3D and 2D viewer on web applications.

- Web based, can be accessed from multiple devices.
- Contains a lot of ready-to-use extensions to improve the interaction.
- Allow the creation of custom interactions.
- Allow the access of properties database to get information about the model.
- Developed using Three JS.
Forge Viewer on a 3D Model

Forge Viewer on a 2D Model

BIM360

Part of Autodesk Cloud Solutions, is a cloud platform for the AEC Industry.

Document Management
Cost Management
Coordination
Analytics
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BIM360 - User Interface
BIM360 API

- Create Projects
- Invite Users
- Manage Folders w/ Data Management APIs
- Manage Files w/ Data Management APIs
- Automatic Conversion of files
BIM360 API

- Account Admin
- Issues
- RFIs (beta)
- Document-related (Pushpin) Issues and RFIs (beta)
- Checklists
- Document Management
- Model Coordination
- Cost Management (beta)
- Relationships

### Shedmate Registration

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<tr>
<th>Client</th>
<th>Site Address</th>
<th>Builder</th>
<th>Job</th>
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- **Back**

**This client is a Company**

- **First Name**
  - Autodesk
- **Last Name**
  - Demo
- **Email**
  - demo@autodesk.com
- **Phone**
  - 99 999 999
- **Phone 2 (Optional)**
- **Get from my location**

**Full Address**

- San Francisco, CA, USA
- **Search**

**Street Number**
Shedmate Registration

Postal Code

Country
United States

State
California

Council
San Francisco County

Coordinates
37.7749295, -122.4194155
## Shedmate Registration

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**Responsible**

- Thiago Almeida - t.almeidaeng@gmail.com

**Actions**

- Confirm
- Cancel
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BIM360
More than 300 projects automated in 2 years, for just 1 company!
Design Automation API

Allows the use of Autodesk’s core products as cloud services.

- Automate design your tasks
- Engines for AutoCAD, 3dsMax, Inventor and Revit
- Reduce the need of a Desktop installed Software
- Make it easier for unspecialized users
- Increase your design operations at scale
- Massively reduce costs
Main Entities

- App Bundles
- Activities
- Work Items
App Bundle

- Package with all your Assembly files
- Can package any type of files
- You can pre-store files that you know you will reuse
Activities

- Analog to an implementation of External Command
- Registers the inputs and the outputs
- Specifies what app bundle will be used to run
Work Item

- You call it with the data to be processed
- You need to specify the ActivityId / Alias to use
- Analog to a call to an External Command
- All files will be deleted after completed
Porting an existing Desktop App
Design Automation API

Example of a desktop (Revit Addin) that was ported to D.A.
Design Automation API

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Design Automation API

Example of a desktop (Revit Addin) that was ported to D.A.
Design Automation API

Sending Information to D.A.
Demo
Resulting Revit file from D.A.
Resulting Revit file from D.A.
Resulting Revit file from D.A.
So how did we managed to do that?
Software Architecture

The MVVM Pattern

View

WPF

View

Model

Model
Software Architecture

This is how our Solution looks on Visual Studio...

Solution Explorer

- Solution 'Shed-builder' (7 of 7 projects)
  - Shedbuilder.Revit.DA
  - Shedbuilder.Revit.Models
  - Shedbuilder.Revit.RevitApp
  - Shedbuilder.Revit.UIApp
  - Shedbuilder.Revit.ViewModels
  - Shedbuilder.Web.Api
  - Shedbuilder.WPF
Software Architecture

Shedbuilder.Revit.App

RevitAPI → App → Models
Software Architecture

Shedbuilder.Revit.UIApp

- App
- View Models
- WPF
- Models

RevitAPI

RevitAPI UI
Software Architecture

Shedbuilder.Revit.DA

RevitAPI

DA

App

Models
Shedbuilder.Revit.DA

• Deserializes the input json file into a data model
• Creates the site plan and its details
• Creates the shed
• Creates plans, elevations and section detailing
• Puts everything in sheets with correct scale
• Saves the file that will be used as output
Software Architecture

Shedbuilder.Revit.DA

DA

App

Models
CI / CD Microsoft Azure

https://docs.microsoft.com/en-us/azure/architecture/example-scenario/apps/devops-dotnet-webapp
Thanks for Attending!