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Introducing the Infraworks 360 API

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SD6503 This class will guide you through the new, exciting, cloud-based API for InfraWorks 360 software. We will cover how to get started and extract data from the model, how to generate report from the extracted information, and how to integrate with other providers—all by reading InfraWorks 360 software models using the REST API. Previous programming knowledge is required (Microsoft C# and Microsoft .NET), and knowledge of REST and the JavaScript API is recommended.

Learning Objectives

At the end of this class, you will be able to:

- Understand the InfraWorks 360 software API architecture
- Learn how to authenticate using Autodesk account
- Read InfraWorks 360 software model data
- Learn how to invoke cloud APIs using REST, the JavaScript API, and C#

About the Speaker

Augusto Goncalves has been a member of DevTech Team since 2008, and he is based in the São Paulo office. He is a specialist in several APIs, including those for AutoCAD software, Revit software, AutoCAD Plant 3D software, AutoCAD Civil 3D software, and cloud. Before joining Autodesk, Inc., Augusto worked on CAD-related developments for civil engineering and web commerce. He is a graduate in civil engineering and holds a master's degree in computer engineer.

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Topics

This class will cover the following topics:

Beta disclaimer

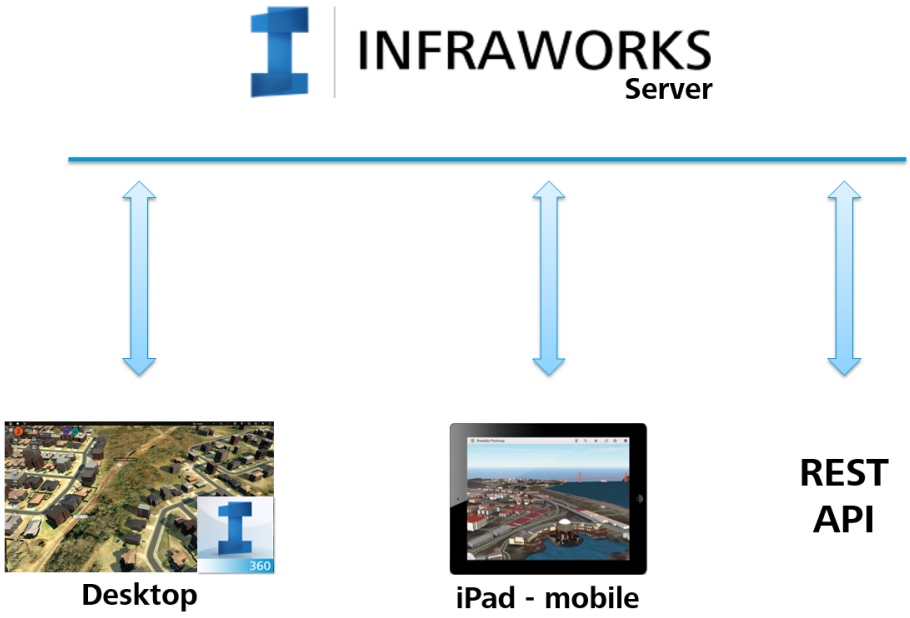
We may make statements regarding planned or future development efforts for our existing or new products and services. These statements are not intended to be a promise or guarantee of future availability of products, services or features but merely reflect our current plans and based on factors currently known to us. These planned and future development efforts may change without notice. Purchasing decisions should not be made based upon reliance on these statements.

These statements are being made as of ***November 2014*** *and we assume no obligation to update these forward-looking statements to reflect events that occur or circumstances that exist or change after the date on which they were made. If this presentation is reviewed after* ***November 2014****, these statements may no longer contain current or accurate information.*

Overview

The Infraworks 360 REST API works on the server and our code can make REST calls to it and query data. The main purpose is share information across all the users (including other applications) of the high-level information creates inside Infraworks 360 models and scenarios.

With that in mind, the overall architecture of the API is as described on the image below. Note that API, desktop client and iPad client can read information on the model shared on the cloud, but not connect to each other directly.



Additionally, as this is a REST API, it is in fact language agnostic, meaning it is available to any type of developing language, from .NET to JavaScript. It can be accessed from your PHP or ASP.NET website, or from a Java application, or any other.

Authentication using Key & Secret pair and Autodesk ID

The authentication to read models is probably the most complicated part. You'll need a key & secret pair, which allow your application to use Infraworks 360 APIs. Second, as the models are securely bounded to each user Autodesk ID, the user needs to authenticate and give your application the permission to read the models. This is done with OAuth authentication model.

Obtaining a Key & Secret pair

As of now (December 2014), the Infraworks 360 API still in beta. To join this beta program, please contact augusto.goncalves@autodesk.com for more details. If your participation is approved, we'll provide you a key & secret and you'll join the beta program.

In the future, if we decide this beta program is mature enough, it will be available at our Developer Portal. Please note this is a beta program and we cannot guarantee it will go into production.

Autodesk ID

In fact, this Autodesk ID is not your ID, but the users ID, meaning anyone that is using your application with their Infraworks 360 models will need to log with their user & password, and your code just needs to ensure the user's Autodesk ID in fact have some models.

As we use OAuth authentication, your application will not access the user's login and password, just an access token that grants your code access to the models for a short period of time.

Important: security, privacy and trust are key factors for an online relationship with users. Please review our Privacy Statement.

Authentication process

That is something you will need to do once. Moreover, I might say it is not the easiest algorithm to implement. Luckily we have the base implementation done in different languages and available on our Github repository.

To summarize, the basic idea is: your application, using your key & secret pair, go to Autodesk server and say "I need to access a user data" and get an oauth token. With that token, you redirect the user to the Autodesk login page, the user authenticate & authorize the access with his/her login and password and the Autodesk login page redirect to your application with an access token. This access token grants access to the user's models on Infraworks 360 server and must be used on every call your app makes. Again, this is implemented on our Github repository.

Accessing Infraworks 360 Models

The Infraworks 360 REST API is based on Models and Object Classes. The first step is access the list of models. For each model, we can access the list of objects by class. The classes are the types of objects on the model, such as Road, Tree, PipeLine, Terrain, etc.

Following from the previous section (Authentication process), an overall workflow is:

1. Authenticate key & secret
2. User authorize access using his/her Autodesk ID
3. Get the list of models
4. For a selected model, get a list of items by class
5. Get all properties of an item

Sample code

The following sample code uses the OAuth and Infraworks 360 libraries available on Github to get all models and all roads on each model. Most of failure check were removed for brevity. Depending on the number of models and roads, this sample may take an extra time to complete, so it's suggested to adjust accordingly.

```
private static OAuthService _oauth = null;
private static InfraworksRestService _iw360 = null;
private static List<ModelInfo> _models = null;

public static void ConnectIW360()
{
  // ******************************************
  // Connect to Autodesk servers
  // This includes the authorization on IW360 and
  // and the user authentcation (Autodesk ID)
  // ******************************************
  // connect to Autodesk SSO (Single Sign On) accounts
  // this will request the user to login (username & password)
  // -> this is a Github sample code
  if (_oauth == null)
  {
    _oauth = new OAuthService(IW360Constants.CONSUMER_KEY,
      IW360Constants.CONSUMER_SECRET, IW360Constants.BASE_OAUTH_URL);
    if (!_oauth.StartOAuth()) return;
  }

  // connect to Infraworks 360 server
  // using the OAuth authentication from the previous step
  // therefore all the information is specific to this user
  // -> this is a Gitbug sample
  if (_iw360 == null) _iw360 = new InfraworksRestService(_oauth);

  // ******************************************
  // Get list of models
  // ******************************************
  if (_models == null) _models = _iw360.GetModels();

  // ******************************************
  // Get list of items by class
  // ******************************************
  foreach (ModelInfo mode in _models)
  {
    Collection roadsProxy = _iw360.GetItemsByClass(_modelId, "roads");

    // ******************************************
    // Get the item details
    // ******************************************
    foreach (Item item in roadsProxy.items)
    {
      int itemId = int.Parse(item.id);
      Road road = _iw360.GetModelItem<Road>(_modelId, "roads", "roads", itemId);
    }
  }
}
```

More Resources

The online Reference Guide is available at the Infraworks 360 website, which includes a list of methods and a basic description of each one.

- Reference Guide
  http://api-devprod-docs.infraworks.autodesk.com/
- Blog posts:
  - **Infraworks 360 REST API – Tech Preview available**
    Basic overview of the API and first steps
    http://adndevblog.typepad.com/infrastructure/2014/05/infraworks-360-rest-api-tech-preview-available.html
  - **Importing Alignment from Infraworks 360 to Civil 3D**
    Sample that imports alignment data from Infraworks 360 cloud model to Civil 3D
    http://adndevblog.typepad.com/infrastructure/2014/10/importing-alignment-from-infraworks-360-to-civil-3d.html

Conclusion

Autodesk Infraworks 360 is revolutionizing the Civil Engineering with an easy to use tool for preliminary design. And that's just the first step. Moving forward, we can imagine how this will affect the next steps, including detailing and coordination with other areas of the design, like buildings, sustainability and city maintenance. The API plays a key role on this scenario by allowing other applications to access the model information.

If you want to use Infraworks 360 REST API on your custom application workflow, send an email to augusto.goncalves@autodesk.com so we can discuss if the API is right for you and how move forward.

Thank you for attending this session! I hope you found the class enjoyable and valuable.