The Grow Back Project Handoff Document

A document detailing how to set up the Grow Back Project on a web server, as well as setting up the Arboretum backend and admin frontend for managing the data used by the Grow Back Project.

Setup

First-Time Installation

To fully install the Grow Back Project, you must install three separate components:

1. The Grow Back Project application, which end users will interact with;
2. The Arboretum admin frontend, which you will use to populate the database, and;
3. The Arboretum WordPress backend, which provides data that the previous two components need to function.

The first time you set up the Grow Back Project, you should have the following handoff materials:

- This document.
- A “growback_frontend.zip” file.
- An “admin_frontend.zip” file.
- A “backend.wpress” file.
- An initial admin username and password.

None of the other handoff materials will be included in this document; all handoff materials will be provided separately for security.

Note: All three applications must be installed onto a web server. **Do not install any of the three applications in the same directory as one another!** Doing so may cause any or all of them to not function properly. If you wish to install all three applications onto the same web server, place them into distinct subdirectories.

To set up the Grow Back Project application:

1. Unzip the contents of the “growback_frontend.zip” file into a subdirectory.
2. Open the “src/treeCatalog.ts” file in a text editor and change the value of the “DEFAULT_TREE_API_URL” line to the URL of your web server.
    a. Only change the portion of the URL *before* “/wp-json”.

To set up the Arboretum admin frontend:

1. Unzip the contents of the “admin_frontend.zip” file into a subdirectory.
2. Open the “upload.js” and “models.js” files in a text editor and change the value of the “baseUrl” line at the top of each file to the new address of the Arboretum backend.

To set up the Arboretum WordPress backend:

1. Install WordPress 6.9.4 on your web server in a subdirectory. Your web host should provide instructions on how to do this. If you intend to self-host the service, please refer to WordPress’s installation guide: https://developer.wordpress.org/advanced-administration/before-install/howto-install/
2. Open your WordPress installation’s admin panel. If your WordPress site is being hosted on https://www.example.com/subdirectory, you may access the admin panel by going to https://www.example.com/subdirectory/wp-admin/.
3. Finish installing WordPress by following the prompts. This includes creating an admin username and password. These **do not** need to be the initial admin username and password provided with the handoff materials. We will need these to log in and import the Arboretum, but they will be replaced within a few steps.
4. Log into WordPress using the username and password you just created.
5. On the left sidebar, go to Plugins > Add Plugin.
6. Search for, install, and enable the “All-in-One WP Migration and Backup” plugin.
7. On the left sidebar, go to All-in-One WP Migration > Import.
8. Click the “raising your upload limit” link on this page and follow the instructions. Once you have raised the upload limit, navigate back to the Import page.
9. Upload the “backend.wpress” file that was included with the handoff materials and wait for the import to finish. **Do not click off of the WordPress browser tab while the import is in progress.**
10. Go to the WordPress dashboard or reload the page. You should be redirected to the login page.
11. Log back into WordPress using the admin username and password that were included with the handoff materials. **The username and password you created in Step 3 will no longer work.**
12. On the left sidebar, go to Users > Profile.

13. Scroll down and change the admin email from the initial value. Scroll to the bottom of the page and click “Update Profile”. WordPress will email whatever email you put into this field to confirm the change of ownership; you must go and verify this in your email.
14. Back on WordPress, scroll to the bottom of the profile page and click “Set New Password”, then follow the prompts to set a new admin password. **Do not continue to use the initial admin password.**
15. On the left sidebar, go to Users > All Users. There should be two users: “admin” and “upload”. Hover over “upload” and click “Edit”.
16. Scroll down to the “Account management” section and click the “Set New Password” button. Change the password of the “upload” account.
17. Scroll down to the “Application Passwords” section.
18. Enter any name into the “New Application Password Name” field and click “Add Application Password”. The application password will be shown on screen. **This is the only time this password will show, so copy it somewhere safe. This is the password you will use to upload trees to the Arboretum from the admin frontend.**
    a. If you lose or forget this password, or simply want to have multiple passwords, you may repeat this step.
19. Scroll to the bottom of the page and click the “Update User” button.

Migrating to a New Web Server(s)

To move the Grow Back Project application or the Arboretum admin frontend, you may simply move the files from one location to another.

Moving the Arboretum backend is more involved:

1. Log in to the Arboretum WordPress backend.
2. On the left sidebar, go to All-in-One WP Migration > Export.
3. Click “Export Site To” > “File” and wait for the file to be created. Then, download the created file.

You may now reinstall the Arboretum WordPress backend on your new web server by following the First-Time Installation instructions, with the following changes:

- The initial admin username and password will be the admin username and password of the previous installation.
- You do not need to reset the admin password.
- You do not need to create any application passwords.

Then, you must update the Grow Back Project application and the Arboretum admin frontend to properly link to the new location of the Arboretum backend.

To relink the Grow Back Project application, open the “src/treeCatalog.ts” file in the Grow Back Project application’s directory in a text editor and change the value of the “DEFAULT_TREE_API_URL” line to the URL of your web server. **Only change the portion of the URL *before* “/wp-json”.**

To relink the Arboretum admin frontend, open the “upload.js” and “models.js” files in the Arboretum admin frontend’s directory in a text editor and change the value of the “baseUrl” line at the top of each file to the new address of the Arboretum backend.

Usage

Note: All subsections here assume you have already fully installed the Grow Back Project and the Arboretum.

Scan a Tree Model

There are several free smartphone apps you can use to scan 3D models. Some examples are:

- 3D Scanner App
- Polycam
- Scaniverse

Some general tips for scanning:

- Move slowly. Scanning anything will take time, and something as complicated as a tree will take even more.
- Anything right next to your scanning target will be included in the scan, so aim for trees that are isolated.
- Make sure your scanning area is well-lit: The scan will capture the colors as they appear, so scanning in the dark will create a dark model that may look out of place when used in most settings. A third-party app can always make the model darker, but it can't make it lighter.
- You're going to have to walk all the way around the tree and scan it from multiple angles, so having a clear walking path is important. Plan your path out beforehand; it will help.
- Aim for
- You can only scan what you see, so try to stick to trees that are shorter than you. We understand that this is incredibly limiting, but we are unaware of any better methods of scanning that are as simple to use and free.
- Practice! Scanning sounds easy, but it's best to practice before you end up in a forest and are wondering why none of your scans are coming out right.

Note: The 3D models you're capturing are going to be displayed on mobile devices, which have limited graphical capabilities compared to a computer. Most 3D scanning apps offer an export/processing mode for models designed for mobile applications. Be sure to use that.

Upload a Tree to the Arboretum

Note: You should already have the model of the tree you wish to upload.

1. Log in to the Arboretum WordPress backend.
2. On the top bar, go to Menu > Upload Trees and wait for the page to load..
3. Upload a .glb model file, a .usdz model file, or both, and fill in the associated information about the tree (common name, Latin name, approximate age in years, etc.).
4. Input the username “upload” and an application password you created during setup / were provided by the admin.
5. Click the “Upload to WordPress” button. The page should display a confirmation message and, if you uploaded a .glb model file, a preview of the model you uploaded.

Add New Data Fields for Trees

To add new data fields to trees,

1. Log in to the Arboretum WordPress backend.
2. On the left sidebar, go to ACF > Field Groups.
3. Hover over the row for “Tree Fields” and click “Edit”.
4. Click the “+ Add Field” button. You may now configure the new data field, including the type, label, name, default value, and whether or not the field is required (under the “Validation” tab).

Data fields of the following types are already supported:

- Text
- Text area
- Number
- Image
- File

Then, in order for these fields to have any effect, you must implement them into the Grow Back Project application and the Arboretum admin frontend.

Add Support for New Model File Types

Note: As of writing, the Grow Back Project application and the Arboretum admin frontend both use the "@google/model-viewer" package to display models in-app. This package **only supports .glb and .gltf files**, and will not display any other model types. Google does not plan to add support for any other model types to this package. Both projects also support .usdz files, but these are not the main model file format used. If you wish to support new file types, you will need to find a new library to display the models in AR and in-app.

The instructions for how to make the Arboretum backend work with new file types is as follows:

1. Determine the MIME type of the new file type. You can usually do this by searching "mime type [extension]" on Google.
    a. If you do not know the extension of the file type you want to add support for, you can enable viewing file extensions on Windows 10/11 and macOS by following one of the following guides:
    b. https://support.microsoft.com/en-us/windows/common-file-name-extensions-in-windows-da4a4430-8e76-89c5-59f7-1cdbbc75cb01
    c. https://support.apple.com/guide/mac-help/show-or-hide-filename-extensions-on-mac-mchlp2304/mac
2. Log in to the Arboretum WordPress backend.
3. On the left sidebar, go to Settings > Mime Type Settings.
4. Scroll to the bottom of the page so that you can see the text field under "Add Values".
5. Add a new line to the text field in the specified format. As of writing, this is "[extension] = [mime type]".
6. Click the "Save" button below the text field.
7. Add a new data field in the database for your new file type.

    Note: The expected format for model data fields is "model_[extension]"; for example, "model_glb" and "model_usdz". **If you do not use this format, file uploading from the admin frontend will fail for this file type.**
8. In your WordPress installation directory, find and open the ".htaccess" file and scroll to the bottom.
9. Find the "AllowFileDownloads" block. It will contain an inner "FilesMatch" block containing a pipe-separated list of file extensions. Add your file extension to this list. Without this, external websites will not be able to download files of this type from the Arboretum.
10. In the Arboretum admin frontend, open the "Upload.html" file in a text editor.
11. Find the element with id "myFile". Add the new file type's extension to the "accept" attribute.

Increasing Upload Limit

Note: Every model uploaded to the Arboretum will be downloaded to a mobile device, potentially from a location with poor connectivity. It may be wiser to optimize your models instead of increasing the maximum allowed model size.

If a model file fails to upload in the Arboretum admin frontend, you may need to raise the file size upload limit.

1. Log in to the Arboretum WordPress backend.
2. On the left sidebar, go to Settings > Big File Uploads.
3. The maximum file upload size will be displayed. Change the displayed number to a larger one and click the “Save” button.

Note: If the model that failed to upload is smaller than the listed size, there may be a different issue with the Arboretum frontend. If this issue persists, you may need to upload directly to the Arboretum backend.

Improving Model Performance

If, during the multi-model mode session, you notice that your tree model heavily impacts the visual performance of the web app, i.e., the app begins lagging, and model tracking becomes jumpy, you can try reducing the number of polygons that the tree models use. This can be done through 3D-modeling apps such as Blender. A useful video detailing this process can be found here, starting at the timestamp 1:30.

Note: The process described in the video generally works well only for 3D scans and not 3D models designed from scratch.

Adding New Features/Adjustments to Multi-Model

As of writing, the multi-model feature of the Grow Back Project application is implemented using the Needle Engine library. Documentation for its web-based features and properties can be found here. Additionally, Needle Engine provides a GitHub page showcasing example projects/templates to reference.

Uploading Directly to the Arboretum Backend

If the Arboretum admin frontend stops working for an unknown reason, it is possible to directly upload models and trees to the Arboretum backend.

1. Log in to the Arboretum WordPress backend.
2. On the left sidebar, go to Trees > Add New Tree.
3. Upload your model(s) and fill in the associated information as you would on the admin frontend.
4. Click the “Publish” button on the right.

Note: Uploading directly to the Arboretum backend will not create preview images for models; you will need to create these yourself. Also, you cannot use application passwords to upload directly to the Arboretum Backend.