Uniworld_Developer_Guide.md

Uniworld Developer Guide

A guide for developers on how to setup the development environment, cloud service dependencies, and deployment.

Uniworld is a real-time 3D environment for university events. This was developed as part of the MEng Computer Science degree final year project at UCL and collaborated with IBM as part of the Industry Exchange Network (IXN).

Features

- **3D Environment** – The 3D environment contains a lobby scene, event hall, lecture hall, and IBM university centre.
    - The event hall contains dynamically created rooms with meeting tables arranged in a grid layout
    - The lecture hall contains dynamically created rooms with an embedded lecture slide
    - Rooms are dynamically created via the Editor and loaded from the API
    - The IBM university centre contains objects linked to online learning resources and past project showcases as part of the IBM university programs.
- **Editor** – The web-based tool for creating and managing virtual event rooms and lecture rooms.
- **API** – The backend which provides RESTful endpoints for reading and manipulating event room and lecture room data from the database. Also, it provides endpoints for uploading files to Azure blob storage.

Technology Stack

The uniworld project uses a wide range of technologies:

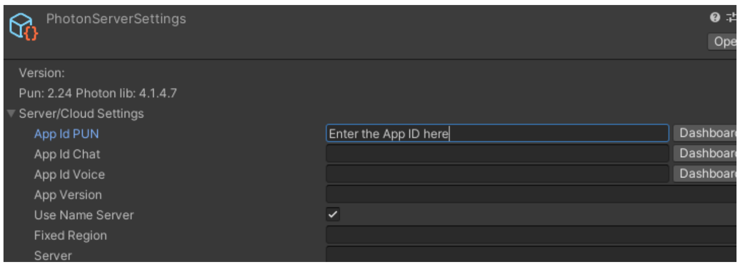
- Unity - 3D game engine for the main Uniworld environment
- Photon Engine - Networking engine and multiplayer platform integrated with Unity
- ReactJS - Front-end Javascript library for Uniworld Editor
- Material UI - Popular React UI framework
- Azure Functions - Serverless REST API for Uniworld
- Azure Blob Storage - Blob storage for uploading media files

Uniworld 3D Environment

Setup Guide

1. Install Unity Hub and Unity 2019.4.10
2. Download the repository available at: https://github.com/bymi15/uniworldsrc and move the `UniworldWithoutVoice` directory to the Unity project directory. Instructions on how to import projects into Unity is available at: https://docs.unity3d.com/2018.3/Documentation/Manual/GettingStartedOpeningProjects.html
3. Launch Unity and wait for it to finish importing the assets (this may take a while)
4. Go to Window > Photon Unity Network > Highlight Server Settings (or open `Assets/Photon/PhotonUnityNetworking/Resources/PhotonServerSettings.asset` in the Unity Editor).

   Next, fill in the App Id PUN value:

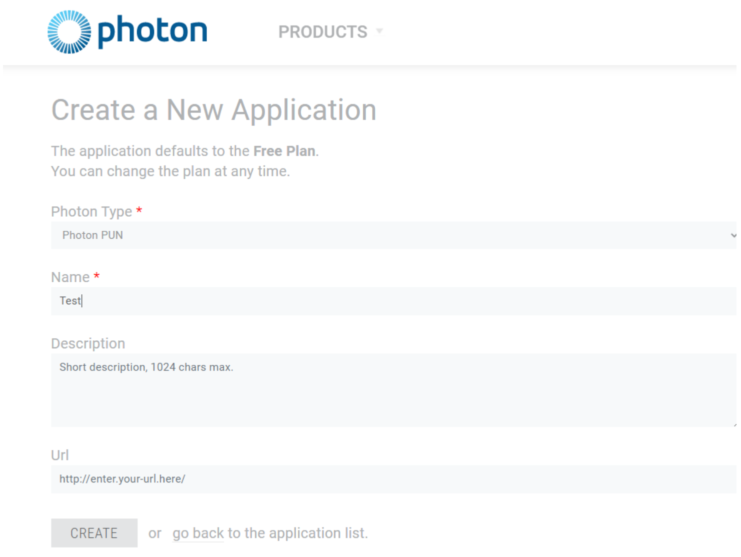


PhotonServerSettings

Version:
Pun: 2.24 Photon lib: 4.1.4.7
Server/Cloud Settings

App Id PUN	Enter the App ID here
App Id Chat	
App Id Voice	
App Version	
Use Name Server	✓
Fixed Region	
Server	

The App Id can be obtained by registering an account at Photon Engine and creating a **Photon PUN** app.

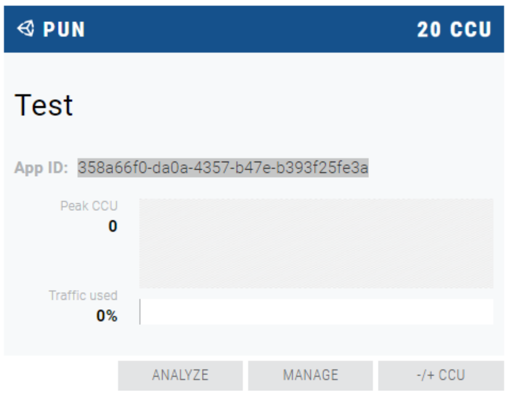


Create a New Application

The application defaults to the **Free Plan**.
You can change the plan at any time.

Photon Type *	Photon PUN
Name *	Test
Description	Short description, 1024 chars max.
Url	http://enter.your-url.here/

CREATE or go back to the application list.



PUN 20 CCU

Test

App ID: 358a66f0-da0a-4357-b47e-b393f25fe3a

Peak CCU 0

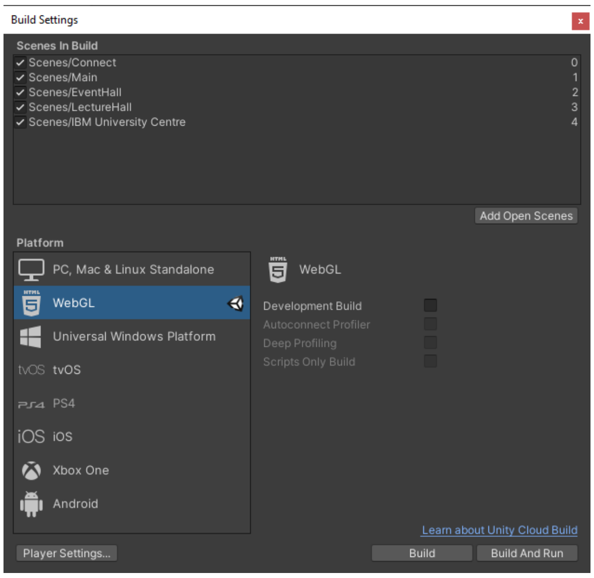
Traffic used 0%

ANALYZE MANAGE -/+ CCU

5. If you wish to use voice functionality, copy the `UniworldWithVoice` folder instead of the `UniworldWithoutVoice` folder. **Note:** This will require purchasing the asset: Voice Pro - WebGL, Mobile, Desktop available in the Unity asset store.
   - To use this implementation:
     a. Purchase the Voice Pro - WebGL, Mobile, Desktop asset
     b. Move the contents of the asset into: `Assets/Scripts/Networking/Voice`
     c. Open the `Connect` scene (found in `Assets/Scenes/Connect.unity`)
     d. Select the `VoiceManager` game object and remove any scripts causing errors
     e. Attach `Listener` and `Speaker` scripts to the game object

Build and Deployment Guide

1. Go to File > Build Settings
2. Make sure WebGL is selected as the platform and click build



Build Settings

Scenes In Build

✓ Scenes/Connect	0
✓ Scenes/Main	1
✓ Scenes/EventHall	2
✓ Scenes/LectureHall	3
✓ Scenes/IBM University Centre	4

Add Open Scenes

Platform: PC, Mac & Linux Standalone; WebGL (selected); Universal Windows Platform; tvOS; PS4; iOS; Xbox One; Android

WebGL

Development Build
Autoconnect Profiler
Deep Profiling
Scripts Only Build

Learn about Unity Cloud Build

Player Settings... Build Build And Run

3. Once the build is complete, the following should be generated:

    - `Build`
        - `Build.data.unityweb`
        - `Build.json`
        - `Build.wasm.code.unityweb`
        - `Build.wasm.framework.unityweb`
        - `UnityLoader.js`
    - `TemplateData`
    - `index.html`
4. Simply upload the contents to a static host or cloud storage platform such as `Github Pages` and `Amazon S3`.
5. Feel free to modify `index.html` and `TemplateData` to customise the web page or replace them with the template provided in: https://github.com/bymi15/uniworldsrc/tree/main/CustomBuild

Uniworld Editor (Front-end React App)

Setup Guide

0. Make sure you have NodeJS installed
1. Download the Github repository: https://github.com/bymi15/uniworldeditor
2. Update the `src/config.js` file as follows:
    - Change the `baseURL` value to the URL of the deployed Uniworld API Back-end
    - Change the `platformURL` value to the URL of the deployed application (e.g. `"https://<USERNAME>.github.io/<REPOSITORY_NAME>"`)
3. Open the terminal and run `npm install` to install the dependencies
4. Run `npm run test` to run the unit / integration tests
5. Run `npm start` to run the application locally (for development)

Deployment Guide

- Run `npm run build` to build the application and generate static html/css/js files that can be manually deployed to any static host or cloud storage platform such as `Github Pages` and `Amazon S3`.
- Run `npm run deploy` to automatically deploy the application to Github pages. **Note**: This will require you to create a new repository to copy the files in and update the `homepage` field in `package.json` to: `"https://<USERNAME>.github.io/<REPOSITORY_NAME>"`

Uniworld API (Back-end)

Pre-requisites

- Register an Azure account at: https://azure.microsoft.com/
- Go to the Azure portal: https://portal.azure.com/ and login to your account
    - Create a **Function App** resource and take note of the URL
    - Create a **Azure Cosmos DB** resource and take note of the *db port, username and password* displayed under: *Settings* > *Connection String*
    - Create a **Storage account** and make sure to set *account kind* as *blob storage*. Also, take note of the *connection string* displayed under: *Settings* > *Access Keys*
- Install VS Code
- Install the Azure Functions VS Code extension and login with your Azure account

Setup Guide

0. Make sure you have NodeJS installed
1. Download the Github repository: https://github.com/bymi15/uniworldapi
2. Open a terminal and run `npm install` to install the dependencies
3. Create a file called: `local.settings.json` in the root directory with the following content and make sure to fill in the correct values (these values can be obtained through the Azure Portal):

```
{
  "IsEncrypted": false,
  "Values": {
    "AzureWebJobsStorage": "",
    "FUNCTIONS_WORKER_RUNTIME": "node",
    "DB_NAME": "ENTER_DB_NAME",
    "DB_PORT": 10255,
    "DB_USER": "ENTER_DB_USER",
    "DB_PASSWORD": "ENTER_DB_PASSWORD",
    "BLOBSTORAGE_BASE_URL": "https://ENTER_BLOBSTORAGE_NAME.blob.core.windows.net",
    "BLOBSTORAGE_CONNECTION_STRING":
"DefaultEndpointsProtocol=https;AccountName=ENTER_ACCOUNT_NAME;AccountKey=ENTER_BLOBSTORAGE_ACCOUNT_KEY_HERE;EndpointSuffix=core.

  },
  "Host": {
    "CORS": "*"
  }
}
```

4. Press `F5` in VS Code or run the command: `npm start` to run the app locally

Deployment Guide

- The `.github/workflows/main_uniworld.yml` Github Action file should already be set up
- Pushing any code to the `main` branch will automatically deploy the code to production

Available API Endpoints

Function	Request Type	URL
blobs-delete	DELETE	api/blobs/{container}
blobs-get	GET	api/blobs/{container}
blobs-post	POST	api/blobs/{container}
eventrooms-delete	DELETE	api/eventrooms/{id}
eventrooms-get	GET	api/eventrooms
eventrooms-getbyid	GET	api/eventrooms/{id}
eventrooms-post	POST	api/eventrooms
eventrooms-put	PUT	api/eventrooms/{id}
lecturerooms-delete	DELETE	api/lecturerooms/{id}
lecturerooms-get	GET	api/lecturerooms
lecturerooms-getbyid	GET	api/lecturerooms/{id}
lecturerooms-post	POST	api/lecturerooms
lecturerooms-put	PUT	api/lecturerooms/{id}

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