

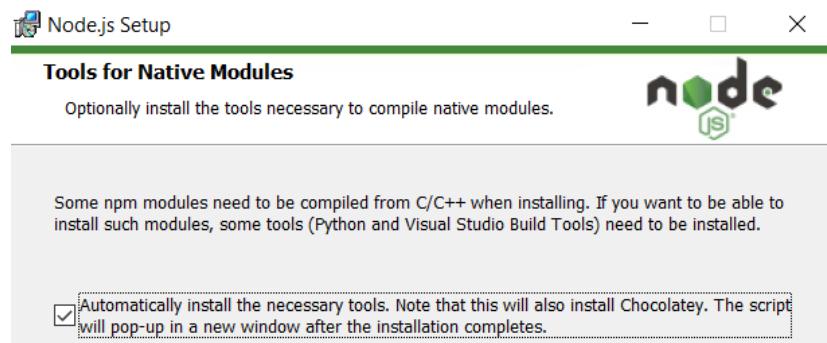
ENT516 -- DigiBridge Visualisation

1 Preparation

1.1 Install Node.js and npm:

Download Node.js (LTS version recommended) from <https://nodejs.org/en/> and install it following the instructions.

Note: please click "Automatically install the necessary tools. ...":



To check if Node.js and npm are installed successfully via command prompt (cmd):

```
node -v  
npm -v
```

1.2 Install Anywhere static file server

Install Anywhere server via command prompt (cmd):

```
npm install anywhere -g
```

1.3 Download and install coding environment:

Sublime Text: <https://www.sublimetext.com/>

or VSCode: <https://code.visualstudio.com/>

or other lightweight IDE

1.4 Cesium account registration:

Sign up a account for Cesium ion: <https://cesium.com/ion/signin>

1.5 Model files:

cardiffBridge models (see the folder -- Models):

```
cardiffBridge.ifc; cardiffBridge.gltf; cardiffBridge.xkt; cardiffBridge.json
```

Please submit your generated IFC models of Swing Bridge before 4 May (Week 10). Then the TAs will help you with file conversion (ifc to xkt) and provide you with the converted model files:

```
swingBridge.ifc; swingBridge.gltf; swingBridge.xkt; swingBridge.json
```

2. GIS --Cesium

Download Lab_GIS folder to a selected path, e.g., to Desktop as below,

```
C:\Users\BIMSE\ ... \Desktop\Lab-GIS
```

2.1 Start Cesium platform and find target bridges (Hello, Cesium World!)

Navigate to Lab-GIS folder via command prompt (cmd) with cd (change directory), e.g.,

```
cd C:\Users\BIMSE\ ... \Desktop\Lab-GIS
```

Note: the full path of folder depends on your own PC.

Then start Anywhere static server at port 7000 via command prompt (cmd).

```
anywhere 7000
```

Now the server is running at the assigned IP and port. You will see a web page and a back-end service running like below:

Original web page:



Back-end service:

```
C:\WINDOWS\system32\cmd.exe - "node" "C:\Users\Glen\AppData\F
Microsoft Windows [Version 10.0.19043.1586]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Glen>cd C:\Users\Glen\Desktop\Lab-GIS

C:\Users\Glen\Desktop\Lab-GIS>anywhere 7000
Running at http://10.74.3.171:7000/
Also running at https://10.74.3.171:7001/
```

Note: Please keep this back-end service running during the GIS lab.

At the original web page, click Task_1.html in web page to start Task 1. It would take a few seconds to load the map. You can find the Cardiff Bridge, located at the west to the castle. Please search Cardiff Castle, Cardiff County, Wales, United Kingdom in 



Similarly, if you use the Swing Bridge, please search Llandarcy, and select Llandarcy, Wales, United Kingdom from the pop-up list, the Swing Bridge is at the northeast to Llandarcy.



2.2 Add models into Cesium platform

Use webpage button ← returning to the original web page.



2.2.1 Add the model into the Cesium ion

You should have already registered a new account for Cesium ion at <https://cesium.com/ion/signin>, so please go to <https://cesium.com/ion> and log in.

Firstly, click My Assets and Add Data with the file -- cardiffBridge.gltf, in the folder -- Models.

The left screenshot shows the 'Add Data' page. It has a blue header with 'Stories', 'My Assets' (which is highlighted), 'Asset Depot', 'Access Tokens', and 'Usage'. Below the header is a large blue box containing text: 'You can drag and drop multiple files and directories onto this page. Zip files are also supported. See [Tiler Data Types and Formats](#) for more information.' At the bottom are two buttons: 'Add files...' and 'Add from S3...'. The right screenshot shows the 'My Assets' page. It has a similar blue header. Below the header is a large blue box containing the text 'My Assets'. At the bottom is a single blue button labeled 'Add data'.

Choose 3D Model (tile as 3D Tiles) as data type and upload. It will take some time to generate the tile.

The screenshot shows the 'Add Data' page of the Cesium ion interface. The header includes 'Stories', 'My Assets', 'Asset Depot', 'Access Tokens', and 'Usage'. The main area has a title 'Add Data'. On the left, there's a table with columns 'Files', 'Size', and 'Remove'. One row shows 'cardiffBridge.gltf' with '862.61 KB' and a trash icon. Below this is a button 'Add files...'. On the right, there are two input fields: 'Asset name' with 'cardiffBridge' and 'What kind of data is this?' with '3D Model (tile as 3D Tiles)' selected. A note at the bottom states: 'ion will tile your BIM, CAD, or generic 3D models into 3D Tiles.'

Secondly, click Adjust Tileset Location.

The screenshot shows two adjacent web pages. On the left, the 'My Assets' page lists various assets: 'cardiffBridge' (3D Tiles, 19/03/2022, 862.61 KB), 'Cesium OSM Buildings' (3D Tiles, 30/04/2020), 'Bing Maps Road' (Imagery, 27/10/2016), 'Bing Maps Aerial with Labels' (Imagery, 27/10/2016), 'Bing Maps Aerial' (Imagery, 27/10/2016), and 'Cesium World Terrain' (Terrain, 17/10/2016). On the right, the 'cardiffBridge' asset page shows a 3D model of a bridge. A red box highlights the 'Adjust Tileset Location' button. Below the model, a message says '⚠ Tileset location has not been set'. At the bottom, there are 'Information' and 'Source Files' tabs, and the asset ID '884845'.

Search Cardiff Castle, Cardiff County, Wales, United Kingdom and choose Cesium World Terrain. Then click Next.

The screenshot shows the '3D Tiles Location Editor' interface. On the left, under 'Position', a search bar contains 'Cardiff Castle, Cardiff County, Wales, United Kingdom'. On the right, an aerial map of Cardiff shows the castle's location. Below the map, under 'Terrain', a table lists 'Mean Sea Level' (Terrain) and 'Cesium World Terrain' (Terrain, 17/10/2016). A red box highlights the 'Cesium World Terrain' row. At the bottom left is a 'Next' button.

Please fit the bridge model into the appropriate location. You can use arrows and auxiliary tools to adjust the bridge location, scale, etc. Finally, save your satisfactory result and back to myAssets.

The screenshot shows the '3D Tiles Location Editor' interface with the 'Globe Settings' tab selected. On the left, under 'Position', the search bar contains 'cardiff'. Under 'Rotation', the 'Heading' slider is at 0 and the 'Pitch' slider is at 0. On the right, the 3D view shows a bridge model floating over a river. A 3D transform control is overlaid on the bridge, featuring arrows for rotation and scaling, and a small camera icon for position adjustment. The Cesium logo and attribution are visible at the bottom.

2.2.2 Add the model into Cesium platform and run it on Anywhere server

Asset ID is obtained in My Assets of Cesium ion (<https://cesium.com/ion>).

Token is obtained in Access Tokens of Cesium ion (<https://cesium.com/ion>).



Navigate to Lab-GIS folder and open Task_2.html with Sublime (or VSCode) to modify the code below:

Line 62-64:

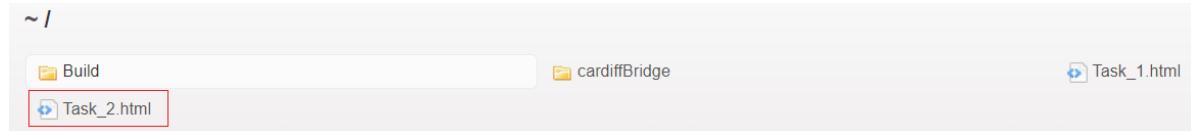
```
// Get your token from https://cesium.com/ion/tokens  
// And replace the below with your token  
Cesium.Ion.defaultAccessToken = 'your token';
```

Line 94-95:

```
// Get the asset ID from My Assets in Cesium ion  
var assetID = 884845; // Replace the number with your assetID
```

Note: please save the code after modification.

Go to the original web page and click the Task_2.html.



Please select digiBridge in the drop-down list at the top-left corner of the webpage:



2.2.3 Project description

Navigate to Lab-GIS folder and open Task_2.html with Sublime Text (or VSCode).

The DigiBridge project description is in line 121 - 127 as div1, div2, ... div6.

With a little HTML knowledge, you can modify the information shown on DigiBridge. If you are interested in it, please have a try.

2.2.4 Swing Bridge

In principle, you can also implement the same steps for your generated Swing-Bridge model. The TAs will provide you with swingBridge.gltf after your submission of IFC model.

3. Xeokit-bim-viewer

Xeokit-bim-viewer is part of Xeokit SDK, which is licensed under the Affero GPL V3 license.

Github: <https://github.com/xeokit/xeokit-bim-viewer>

3.1 Visualize the Cardiff Bridge with the Xeokit-bim-viewer

Download Lab_Xeokit folder to a selected path, e.g., to Desktop,

```
C:\users\BIMSE\ ... \Desktop\Lab-Xeokit
```

Rename cardiffBridge.xkt to geometry.xkt and copy it to the relative path below:

```
...\\Lab_Xeokit\\data\\projects\\CardiffBridge\\models\\design\\geometry.xkt
```

Rename cardiffBridge.json to metadata.json and copy it to the relative path below:

```
...\\Lab_Xeokit\\data\\projects\\CardiffBridge\\models\\design\\metadata.json
```

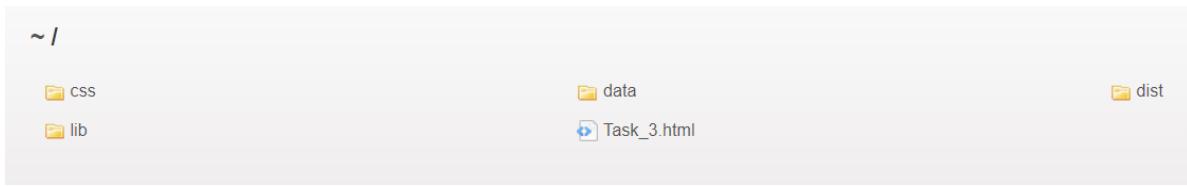
Note: the full paths of the above depend on your own PC.

1) Navigate to Lab-Xeokit folder and start Anywhere server at port 8000 via command prompt:

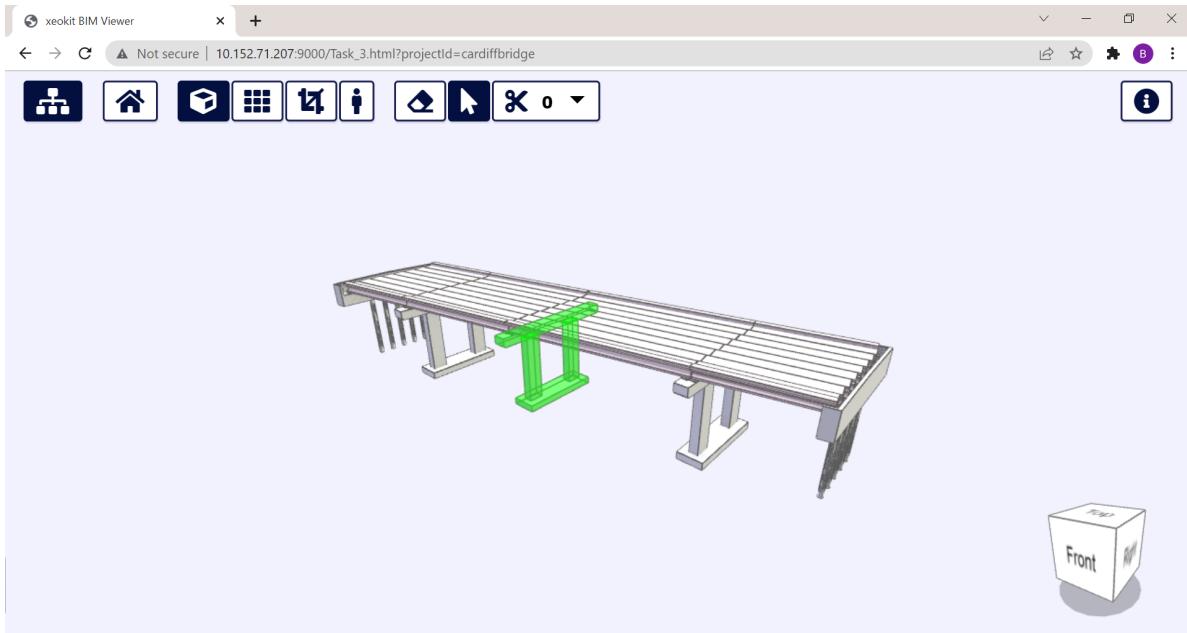
```
cd C:\\users\\BIMSE\\ ... \\Desktop\\Lab-Xeokit  
anywhere 8000
```

2) Click Task_3.html and ...

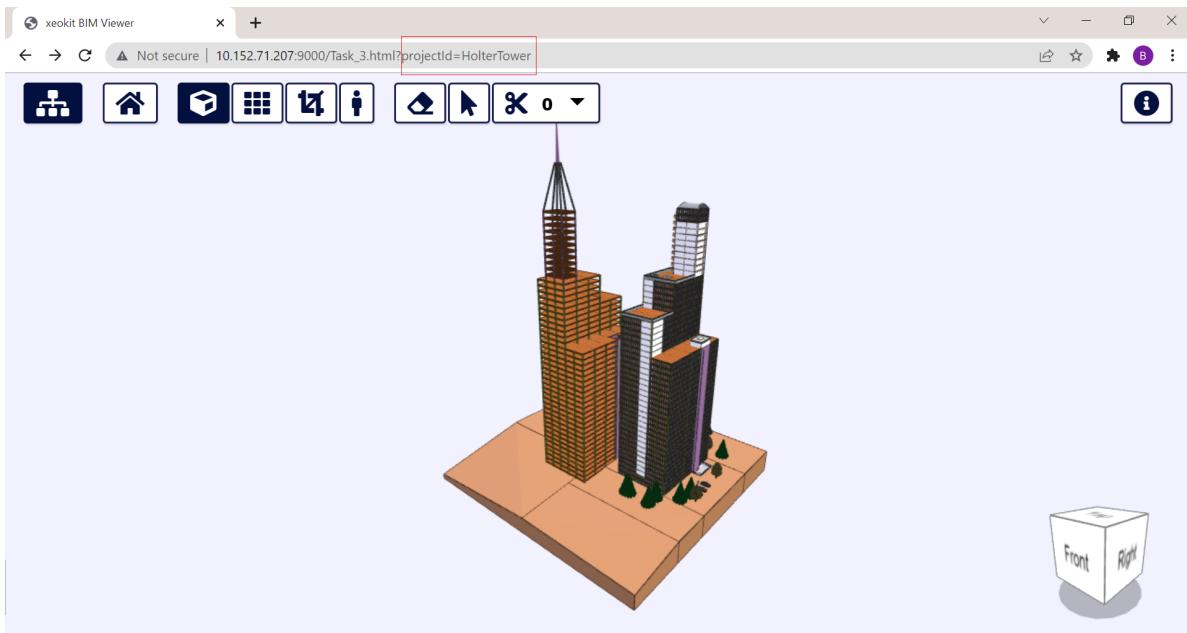
... Fill the part behind ".../Task_3.html" in the address bar with ?projectId=CardiffBridge:



3) There are already several functions developed by Xeokit, so you can have a fun with it:



4) You can also explore other projects by substitute "projectId=" with the project names in the folder -- Lab-Xeokit\data\projects, e.g., HolterTower (as below), WestRiversideHospital, Lyon, WaterLock, MAP.



Bingo! You have your own web-enabled visualization for GIS and BIM now.

Note: In principle, following the similar steps, you can also visualize your generated Swing Bridge model in Cesium and Xeokit with converted files.