COMP220: Graphics & Simulation

5: Textures & Models

Learning outcomes

By the end of this week, you should be able to:

- **Explain** how a 2D texture image can be wrapped onto a 3D model.
- **Explain** how a complex 3D model is represented in memory.
- **Write** programs which draw textured meshes to the screen.

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  - **Explore** options and settings for applying textures to meshes.
  - **Introduce** mesh file formats and the FBX structure.
- Workshop (sync):
  - **Apply** simple textures to our OpenGL primitives.
  - **Implement** code to load models from file using Assimp.

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Basic texture mapping

Shaders vs. textures

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- **But** we can still only pass values at vertices...

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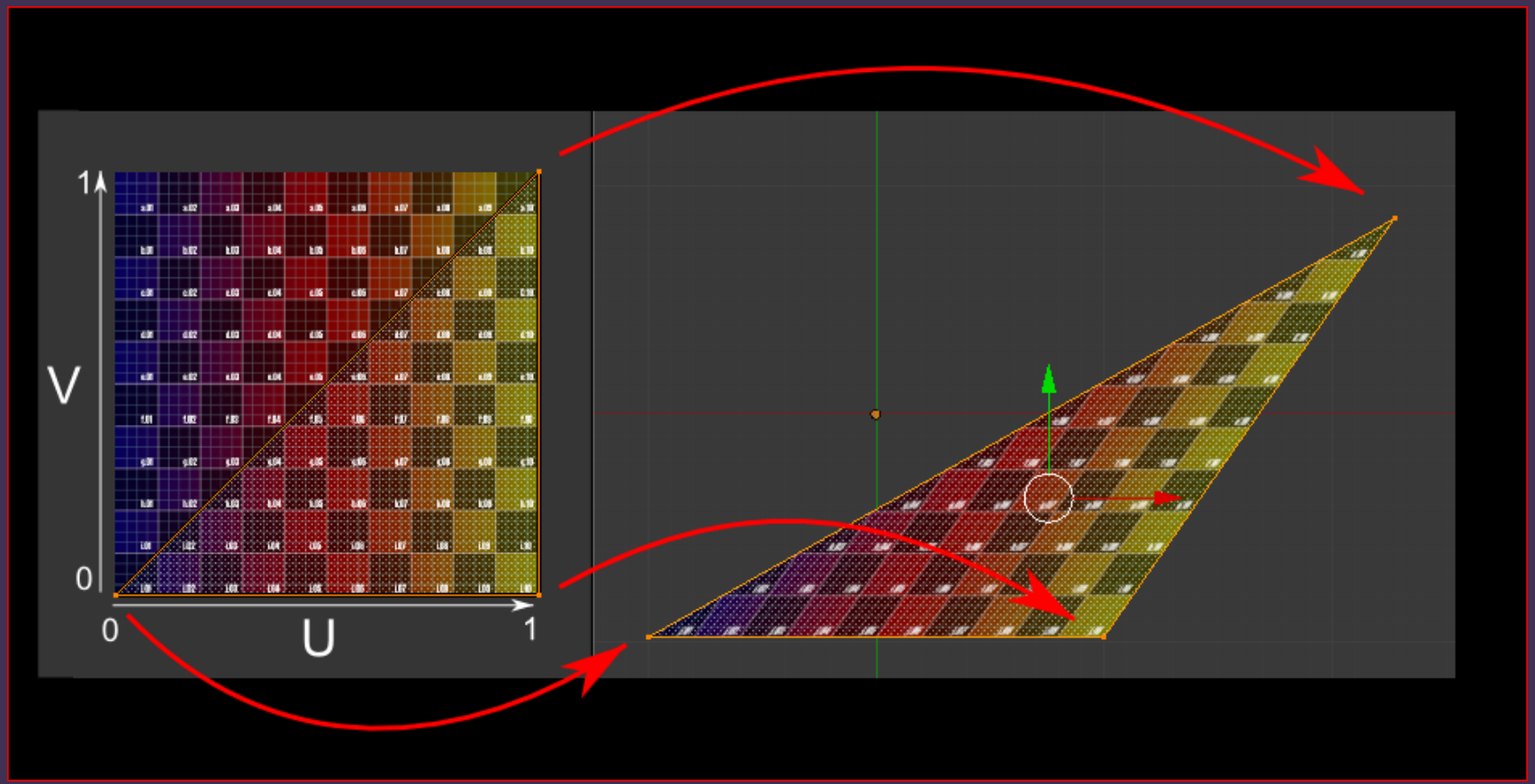
- (So really just another name for *xy* coordinates in texture space)
- Basic idea of texture mapping: give each vertex a *uv* coordinate, and interpolate across the triangle

UV coordinates



Character textures

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Texture parameters

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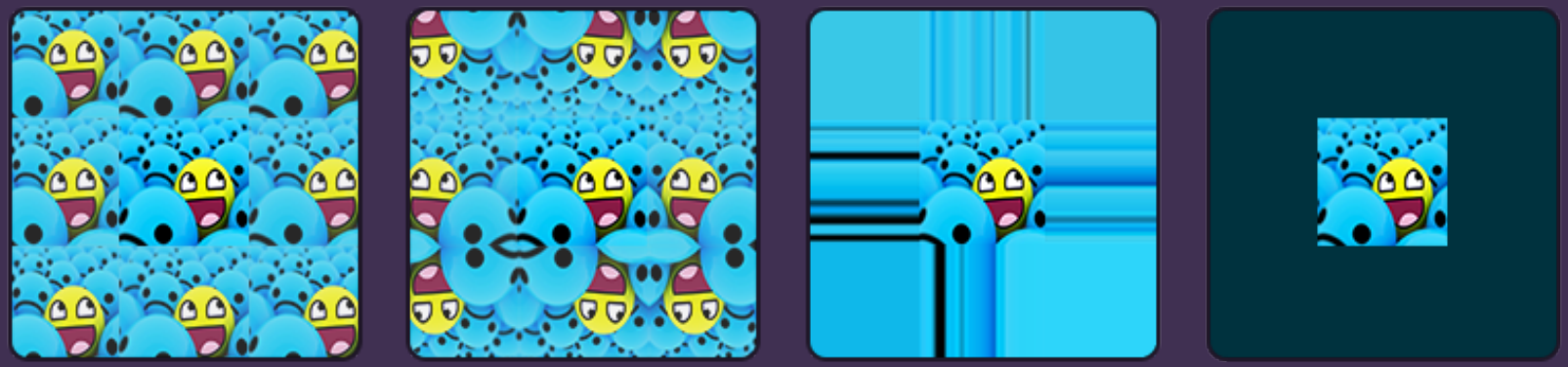

Image source: `https://learnopengl.com/Getting-started/Textures`

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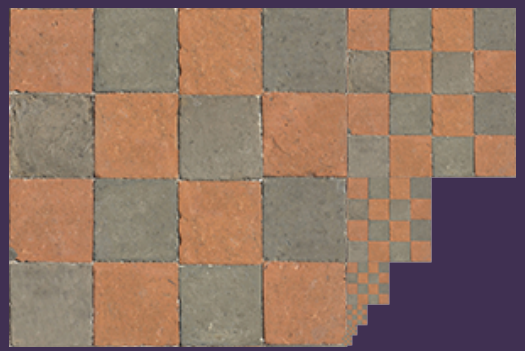

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- Still better to stick to powers of two as some things work better (e.g. mipmapping)
- NB: **rectangular** textures are fine, but **square** textures make UV coordinates saner

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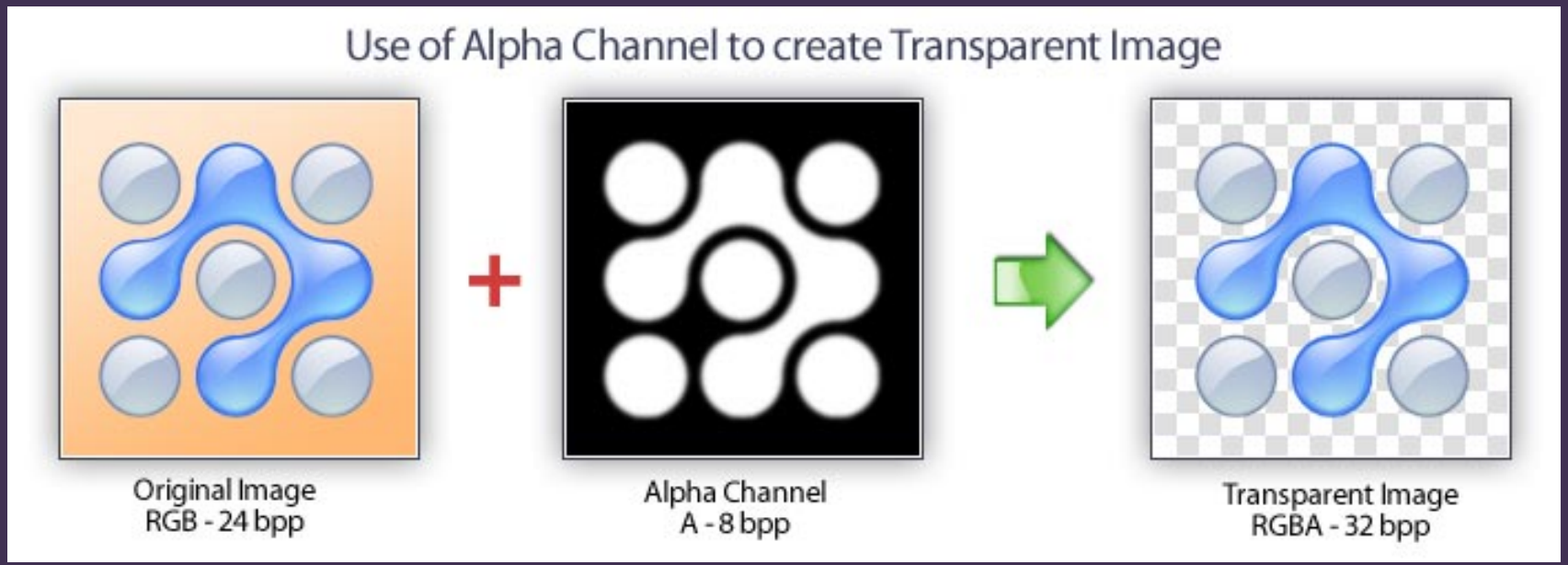

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- Solution: draw semi-transparent objects **after** opaque objects, and in **back to front** order

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Complex meshes

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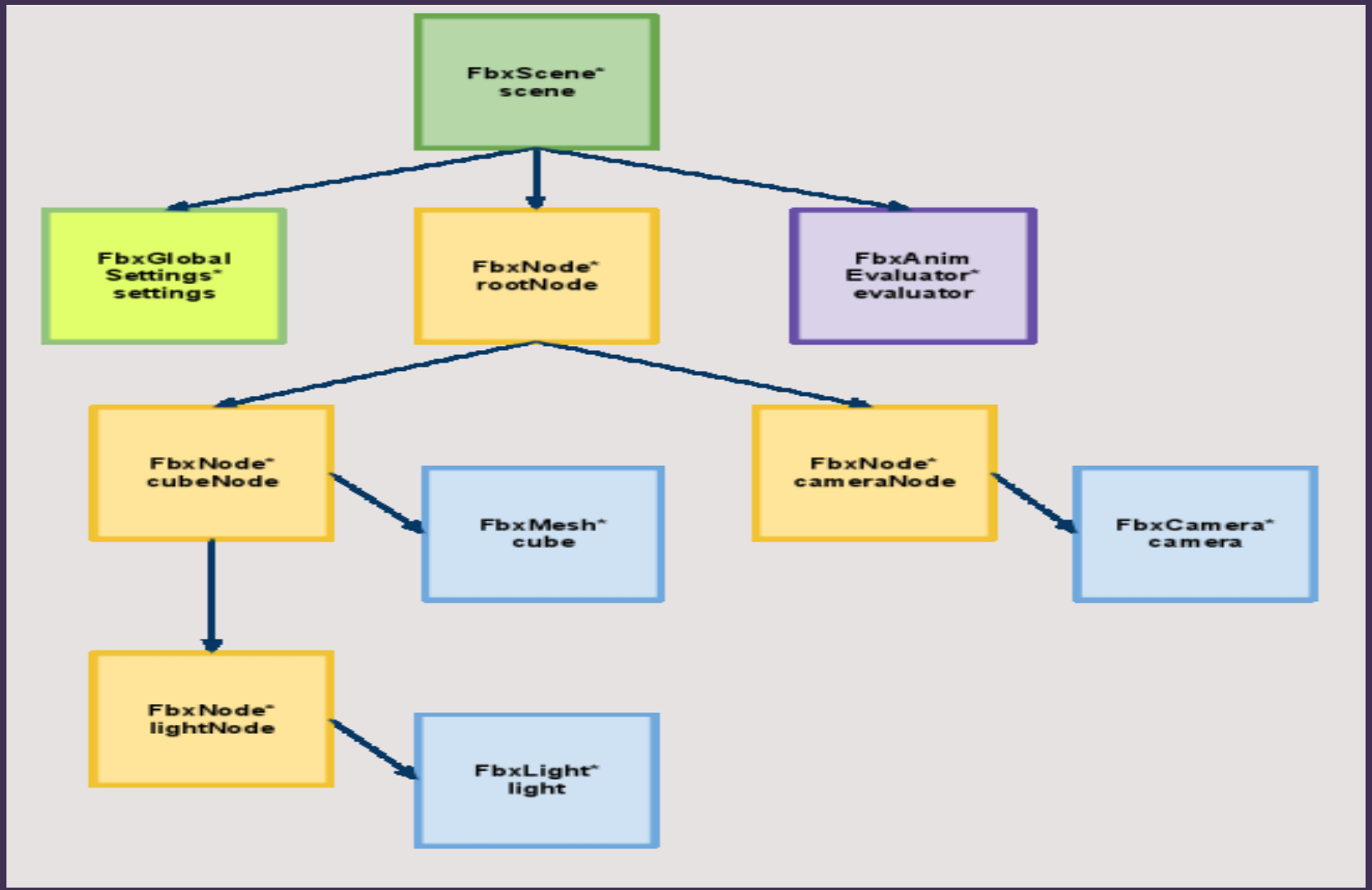
- These formats are optimised for realtime rendering and are very efficient
- Usually developers write exporters for Maya or 3DSMax to support their format
- We are going to use FBX (Autodesk Filmbox) as our model format, this known as an 'interchange' format

Quick Tour of the FBX Format



Next steps

- **Review** the additional asynchronous material for more background on texture properties and a preview of ways to structure code for importing meshes/models.
- **Attend** the workshop to practice loading textures and meshes from file.