Teaching coding through Game Development

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Courses I teach and target groups

- **Basics of Game Development**
  - Digital Learning Games *students*
- **Math and Physics for Games Game Development Patterns Artificial Intelligence for Games**
  - Digital Learning Games *technical students*
- **Modern C++ features**
  - Game Industry *professionals* (3-... years of experience)
- **Mobile Application Development**
  - Computer Science *students*
- **Front-End Web Development**
  - People with 0-3 months experience

Target groups have different expectations. Different expectations lead to different approaches.

Game vs Web and Mobile Development Differences

- Stronger **motivation**, but not for everybody
- Sheer amount **learning the tool**
- **Different** tools compared to usual development
- **Data-driven** approach and other
- **Visual Scripting** in game engines
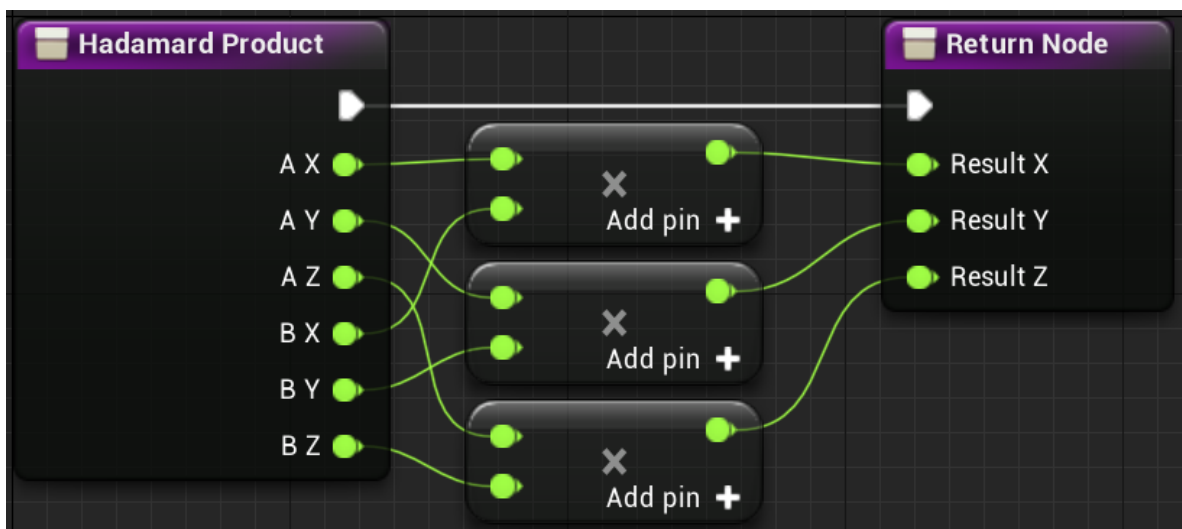
Game vs Web and Mobile Development Similarities

- Practical **code writing** should take at least **half** of your course

- They all need **tools**
- Avoid crunch time **(exams)**
- **Books are your friends**, but really for students

Coding

Simplicity in code samples (*helps focus*)

$$\mathbf{a} \odot \mathbf{b} = \begin{bmatrix} a_1 \\ a_2 \\ \dots \\ a_n \end{bmatrix} \odot \begin{bmatrix} b_1 \\ b_2 \\ \dots \\ b_n \end{bmatrix} = \begin{bmatrix} a_1 b_1 \\ a_2 b_2 \\ \dots \\ a_n b_n \end{bmatrix}$$

```cpp
static Vector3D HadamardProduct(Vector3D A, Vector3D B)
{
    return { A.X * B.X, A.Y * B.Y, A.Z * B.Z };
}
```

```cpp
template<class Num, template <class> class... V>
requires std::conjunction_v<std::is_same<Vector3D<Num>, V<Num>>...>
    && std::is_arithmetic_v<Num>
constexpr static Vector3D<Num> HadamardProduct2(const V<Num> &...args)
{
    return { (args.X * ...), (args.Y * ...), (args.Z * ...) };
}
```

Testing as Scaffolding tool

- Unit tests as way of showing logical bugs

❌ C2628	'std::is_arithmetic<T>' followed by 'auto' is illegal (did you forget a ';'?)
❌ C3520	'T': parameter pack must be expanded in this context
❌ C2988	unrecognizable template declaration/definition
❌ C2059	syntax error: '<end Parse>'

Sharing Code

> Beware temporary folders, they make even smallest game project seem large.

- Source code
- Zip
- Live Share <- *New*
- PDF with code

Homework

> Class size matters.

Individual homework

- Tutorials - **make use of internet**

- **Peer review**- let them learn from what their course mates have learned and lessen your workload.

Group Work

> Good for last assignment, but not always.

Dark Side

> We don't live in ideal world.

- Target group has also differences within
- Time is not your ally
- Preparation is hardest
    - Your example code must have game design ready