The Shady Side of Parallel Computing
(An Introduction to Shaders)

Guest Lecture in Parallel Computing

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About me...

• (Crazy?) Professor: Educator, Futurist, Optimist, Nomad

• Digital Twins, IoT, XR (VR/AR/MR), Software Engineering, Education all over the world

More at https://ulno.net
About you...

- Who has done some game design?
- Who has built 2D games?
- Who has built 3D/VR games?
- Who has used shaders before?
A Word on GPUs – Showtime

• While watching, note down for discussion:
  – What is the point of the following movie?
  – Why is this significant for parallel computing?

• Let’s watch: https://youtu.be/-P28LKWzrI
A Word on GPUs – Discussion

- What was the point of the movie?
- Why is this significant for parallel computing?
- What type of parallel problems can be solved on a GPU – what might be the issues?
Get Ready

- This is for backup purposes when website doesn’t work
- Clone this:
  `git clone --recursive https://github.com/ulno/ShaderTeaching`
- Run webserver in this folder, i.e.:
  `python3 -m http.server`
- Open website: `http://localhost:8000/sample.html`
Let the experiment begin

• Open this: https://thebookofshaders.com

• Follow along, think along, ask questions, and slow me down (if trouble in page, use editor and web browser)
  – I might get stuck too
  – You can help

• Think and note down for end discussion:
  – What works well?
  – What could be problematic programming in such a way (why could people hate it)?
In a game engine: Godot

- Unpack your Godot 4 Beta 3 archive
- Run it
- Create project
- Follow along
Getting Advanced

• This is a summary and outlook (you will not manage to follow along):
  • https://youtu.be/1pJyYtBAHks

• What is the most interesting new feature presented here? What made you curious to try it out?

• What was the most scary/difficult thing?
Lab Tasks

• Solve “Book of Shaders” Chapter 7
  – Implement a function to move and place different rectangles in the same billboard. Show off your skills by making a composition of rectangles and colors that resembles a Piet Mondrian painting (submit shader code and textures).

• Check out shaders at shadertoy – port a “medium” difficult one into Godot (submit shader code and textures).
End Discussion

• How can we take this to parallel computing?
• What is cool/exciting about shaders?
• What is hard/difficult?