



Virtual Reality & Physically-Based Simulation Organization



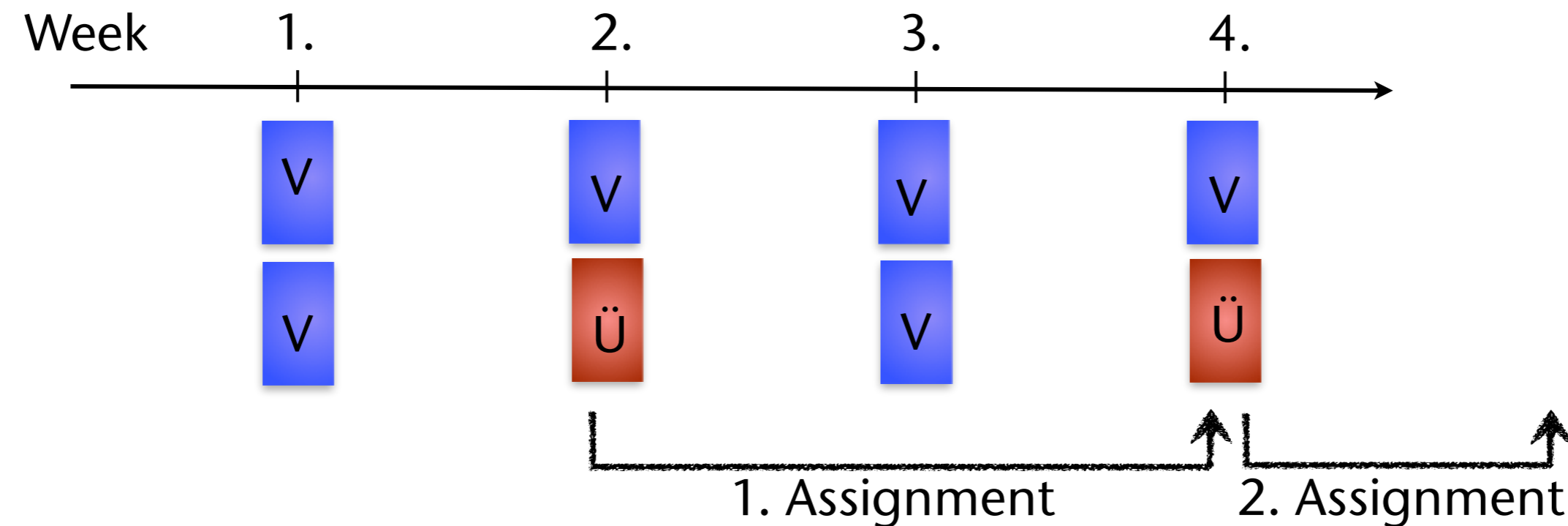
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Where to Find Information on This Course

- The course's homepage:
<http://cgvr.cs.uni-bremen.de/>
→ "Teaching" → "Virtual Reality"
- Slides (a.k.a. Script) & Assignments
- Suggestions for text books, online documentation
- Announcements (rarely)
- Please register in StudIP!
 - Announcements will be communicated through StudIP
- Student chat: <https://discord.gg/YGUZFxf> → "Virtual Reality"
 - Note: I am **not** a member of the chat group!

Lecture and "Lab" Meeting

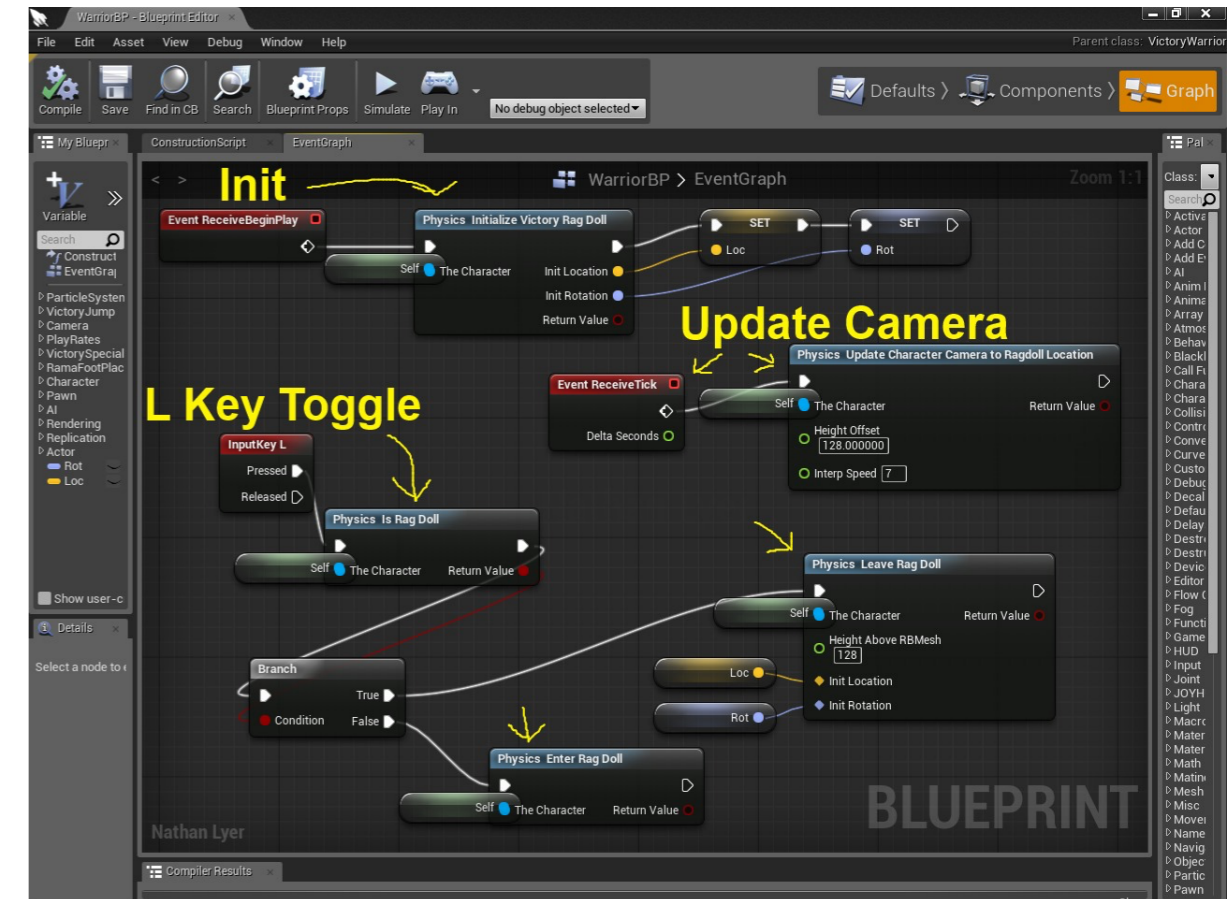
- Approximately once every two weeks: assignment meeting



- Deadline for assignments: specified by tutor!
 - Latecomers get 0 points
- Plagiarism → 0 points and warning
- Don't use ChatGPT!

Assignments

- Mix of theoretical (a few) and practical (mostly) exercises
- Practical = Unreal engine
 - Using "blueprints" first
 - Later some C programming
- Unreal engine: version 5.x
 - Download: www.unrealengine.com
 - See also the links on the course homepage!
- Recommendation: work in groups of 3-4
- If personal hardware insufficient: talk to Sabine Dolhs → sdohls@uni-bremen.de



Introduction to Unreal Engine

- Tutorial on Thursday, Oct 24, 16 ct, room MZH 1400
- See also video recording on the course homepage (older version)
- More tutorials on <https://wiki.unrealengine.com/Videos>
- Start installing UE beforehand!

The Exam

1. Either: long oral exam (= ½ hour per student)
2. Or: points from the assignments + short oral exam
 - Assignments → grade A , short exam → grade B
 - 95% of the points from all assignments → grade A = 1.0
 - 40% of the points from all assignments → grade A = 4.0
 - Total = $\min\left\{\frac{1}{2} \cdot A + \frac{1}{2} \cdot B, B\right\}$
 - Precondition: grade A \geq 4.0 && grade B \geq 4.0 !
(Allgemeiner Teil der Bachelorprüfungsordnungen der Universität Bremen, 2010)
- Note: in all variants, all of the course material could be topics in the exam!

- Criteria for grading the practical assignments:
 - Good (= labelling) variable and function names
 - Sufficient in-line comments
 - Documentation of the function and its parameters (in/out, pre-/post-condition, what does the function do, ...)
 - Functionality (solves assignments? no bugs? ...)
- ChatGPT et al.?

Tentative Overview

- Introduction, immersion/presence/fidelity
- Scenegraphs, game engines, VR frameworks
- Devices
- Stereo rendering
- Techniques for real-time rendering
- Basic 3D interaction techniques: navigation, selection, object manipulation, ...
- High-level 3D interaction techniques: WIM, action-at-a-distance, RDW, ..
- Collision detection
- Haptics, Force feedback algorithms
- Sound rendering algorithms
- Particle systems
- Physically-based simulation using spring-mass systems

Text Books

- No single one will do
- Check out some of the text books given on the course web page
- Use the online documents given on the course web page!
- Make comments in the slide PDFs!

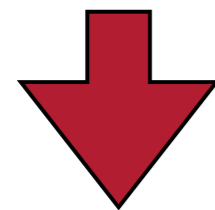
Helpful Knowledge (But Not Formal Prerequisites)

- A little bit of math (just first year)
 - Only needed for the second half
 - A little bit of linear algebra
 - At the end: easy differential equations 😊
- A bit of programming in C/C++, also only towards end of course needed

High-Level Goals of This Course

Cognitive Processes

"Enablement"



"Empowerment"

Remember
Understand
Apply
Analyze
Evaluate
Create

