Game Engine Design

Course SS 2018

Rüdiger Westermann

Lehrstuhl für Computer Graphik und Visualisierung

Games engine design – general infos

- Lecture
  - Monday: 12:30 – 14:00
  - Friday: 8:00 - 10:00
- Announcements, slides, notes
  - http://wwwcg.in.tum.de/teaching/teaching/summer-term-18/game-engine-design.html
  - Password for slides: ss2018
- Two written exams at the end of the semester
  - The first written exam will include the content of the lecture.
  - The second exam will include the content of the practical course.

Games Engine Design – General Infos

- Focus on computer graphics algorithms & implementations
  - Scene modelling and representation
  - Rendering pipeline – from primitives to pixels
  - Texturing, shading and lighting
  - Graphics effects like shadows, reflections, particle effects
- Game engine programming
  - Time-based game loop
  - Motion and collision control
  - Implementation issues

Games Engine Design – General Infos

- Development of a simple game
  - Write your own little game, including engine components
  - Learn how to program real-time graphics effects
- Focus on graphics programming using C++ & Direct3D
  - Graphics APIs and hardware support
  - Real-time graphics using graphics hardware
  - Shaders and effects
- In sync with lecture
  - First learn the algorithms
  - Then implement the algorithms using API, create media assets, and use in game

Games Engine Design – General Infos

- Recommended books

  Games:

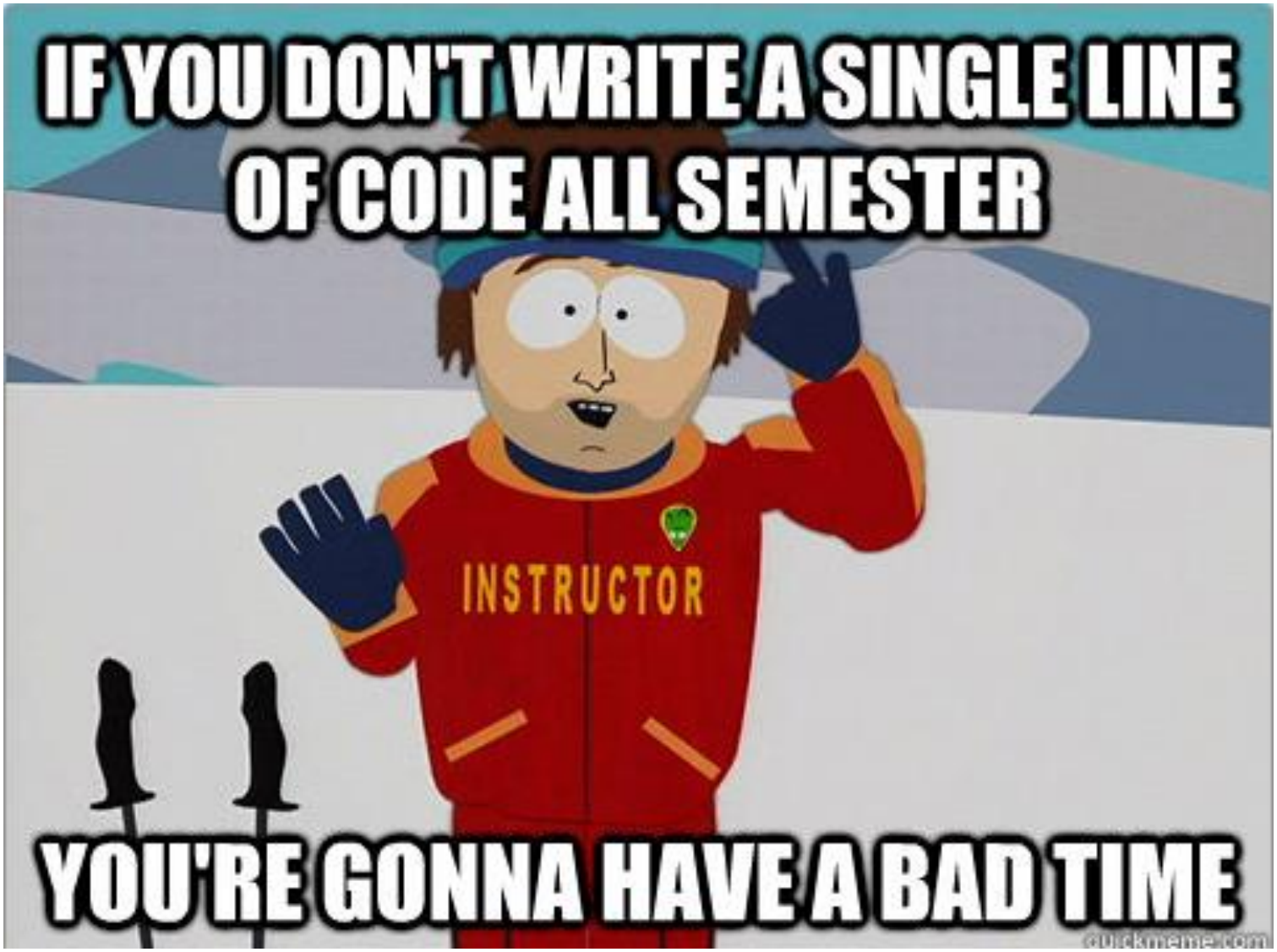
  – Gregory, *Game Engine Architecture*
  – Akenine-Möller, Haines, Hoffman, *Real-time Rendering*
  – Eberly, *3D Game Engine Design*

  Graphics

  – Foley, Van Dam, Feiner, Hughes: *Computer Graphics: Principles and Practice*, Addison-Wesley, 3rd edition
  – Watt, Watt: *Computer Graphics*, Addison-Wesley
  – Glassner: *Principles of digital image synthesis*, Morgan Kaufman

Assignments

- One assignment each week
  - C++ and DirectX
- Final exam
  - You might also have to write some code in the exam…
  - … and I guess your pen won‘t autocomplete your code


IF YOU DON'T WRITE A SINGLE LINE OF CODE ALL SEMESTER
INSTRUCTOR
YOU'RE GONNA HAVE A BAD TIME
quickmeme.com

Assignments

- Up to **1.0 GRADE BONUS** on a **passed** exam
  - Based on your homework‘s success

Requirements		
Solve the assignments	Pass demonstration at the end of the semester	Work in groups of 3-4

Final score (points in all assignments)			
0 - 30%: no bonus	- 60%: .3 or .4 bonus	- 80%: .6 or .7 bonus	- 100%: **1.0 BONUS**

Assignments

- Working in groups of 3 – 4 is **mandatory**
  - No exceptions!
  - Otherwise your homework will not be graded
  - Ask your tutor if you want to be assigned to a group
- Of course, you may (and should!) also share / discuss your ideas with others
  - But: Don‘t just copy & paste parts of the code of other groups!
- Be aware: We check for plagiarism, so don‘t copy and use the code of others for the current assignment
  - You can use previous code of others into which you integrate your current assignment solution

Assignments

- Assignments are handed in via Git
  - Assignments online Friday after the lecture
  - You have **two** weeks to solve the assignment.
  - **Deadline**: Each Friday before the lecture
  - The last uploaded version before 8:00 will be graded by your tutor
  - Inform your tutor if an older version should be graded!
- **Your code must compile**
  - Non-compiling solutions will not be graded!
  - No deferral!
    - 0 Points afterwards

Assignments

- One assignment folder per student
  - Groups: Inform your tutor via e-mail about…
    - Group members
    - Which folder you will use
  - We will give the other group member access to the folder
- ReadMe.txt for anything the tutor needs to know
  - Hotkeys, known issues etc
- Keep your code clean
  - Easier to grade…

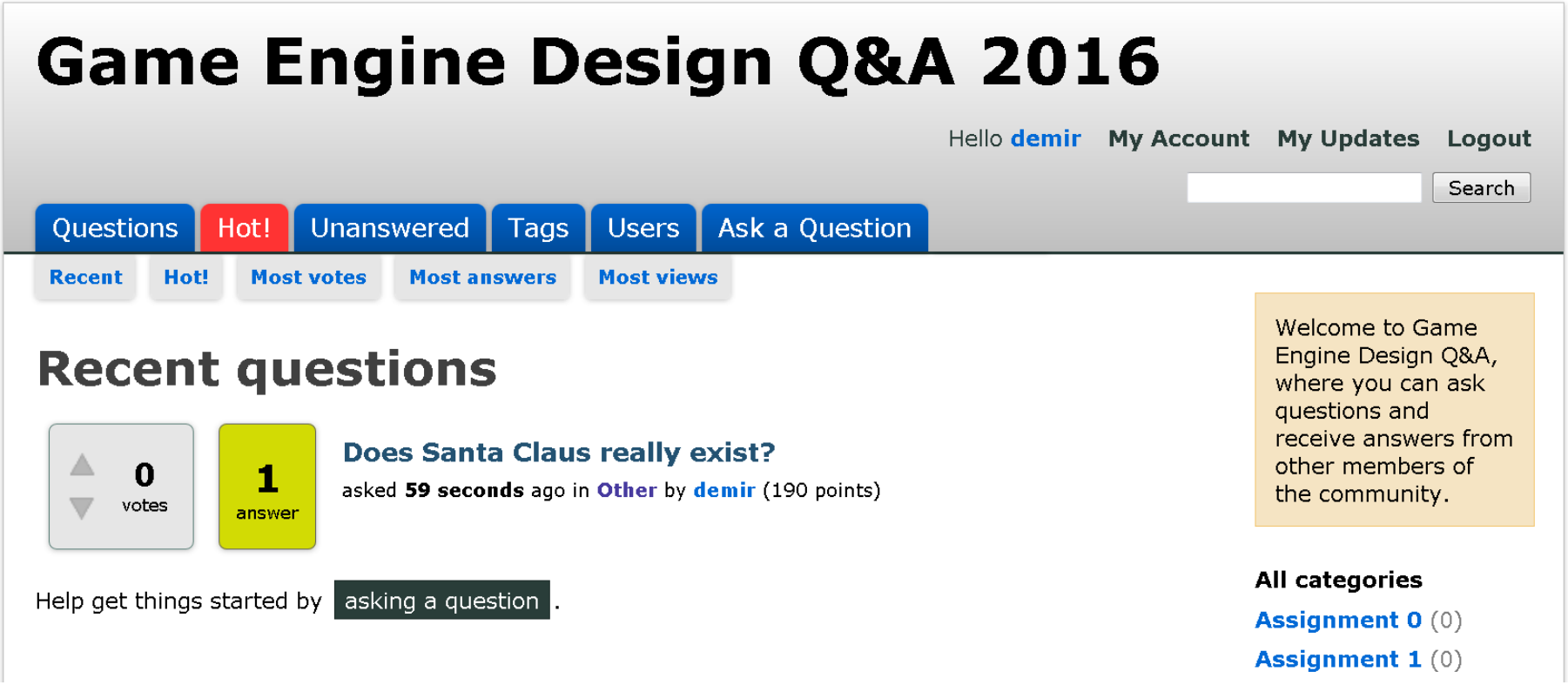
Assignments

- Tutoring groups will consist of two parts
  - Assignment presentation (30 min)
    - Theoretical basics for the assignments
    - Programming hints and examples
  - You can work on the assignments for yourself (90 min)
    - The tutor will be present to answer questions
    - Don‘t expect to get the whole assignment done in this time!
- You may come to **any** tutoring group at any time and leave at any time, but only if the room has capacities
- Slides and assignments will be available a few days before

Q&A

- There is a Question&Answer Forum!

  https://qage.in.tum.de/



Groups

- 8 tutoring groups of up to 20 slots each
  - Registration in TUMOnline open
    Monday 13.04.2018, 20:00
  - First come, first serve, no waiting list beyond these 20 slots!
- Group members: Register at the same tutoring group
  - Otherwise: Ask someone to switch
  - … or ask your tutor if he can handle one more person

Problems/Questions: **Michael Kern** *kernm@in.tum.de*

Groups

- Groups will start **Monday, April 16th**!
  - First week: „Preparation assignment“
  - First two assignments will not be graded
  - Which means „Do them on your own“ rather than „Don‘t do them at all“… you will need them!
- You will get your tutors email address in the first lesson
- In your group, everyone should know the code
  - You won‘t be able to add stuff lateron otherwise
  - And you won‘t be able to answer the questions in the exam

Groups

- Three „GED“ rooms are available

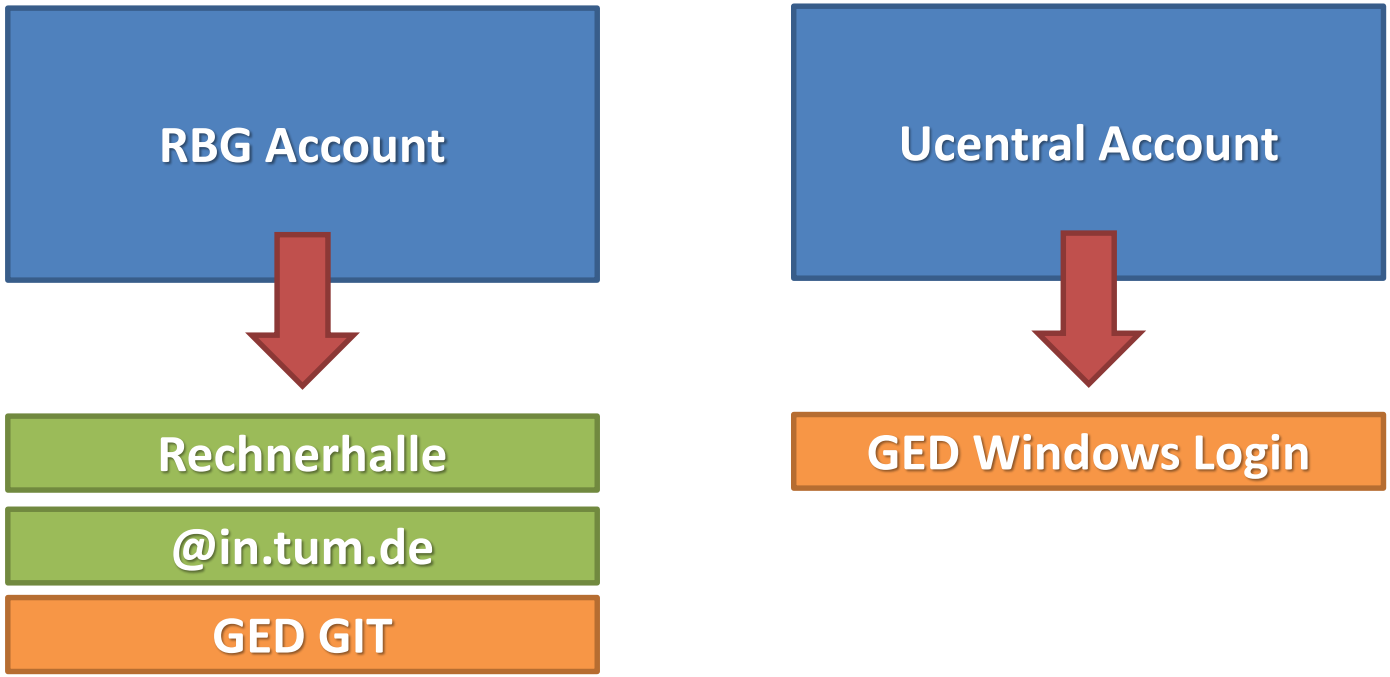
Room	PCs
MI 02.13.008	15
MI 01.05.012	15
MI 01.10.020	10

- You will need specific accounts to access those PCs

- You can get your username and password from the User Central System by the RBG https://ucentral.in.tum.de/
  - Then use „Reset VDI Windows Password“
  - If you do not have an in.tum.de account, please contact the RBG Helpdesk.

Organisation

- You have **two** accounts
  - Same username, should be the same passwords by default!



Groups

Group	Time	Room	Tutor
1	Mo, 14 – 16	MI 02.13.008	
2	Mo, 14 – 16	MI 01.05.012	
3	Di, 10 – 12	MI 02.13.008	
4	Di, 10 – 12	MI 01.05.012	
5	Mi, 10:30-12:30	MI 02.13.008	
~~6~~	~~Mi, 10:30-12:30~~	~~MI 01.05.012~~	
7	Do, 12 – 14	MI 02.13.008	
8	Do, 12 – 14	MI 01.05.012	
9	Do, 14 – 16	MI 02.13.008	
~~10~~	~~Do, 14 – 16~~	~~MI 01.05.012~~	

Registration via tumonline

Prerequisites

- Microsoft Visual Studio
- Microsoft Windows 8 SDK
- Git Client
- DX11-capable graphics card with Shader Model 4.0+

That‘s all

Questions?

(yes, these slides will be online)