Transitioning to a Large-Scale Distributed Programming Course

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Paul Schmiedmayer  Lara Marie Reimer  Marko Jovanović  Dominic Henze  Stephan Jonas

Technical University of Munich, Munich, Germany
The Swift Bootcamp

- Teach application and server-side development in Swift as a prerequisite for the iPraktikum [1] capstone course
- Up to ten tutors (teaching assistants) who supervise and support students
- Homework assignments are corrected using pull requests to provide in-depth feedback
- The lecture hall setting was not possible due to the COVID-19 pandemic

Online Streamed Sessions

- Similar schedule to October 2019
- Option 1: Live-streamed, live sessions
- Option 2: Live-streamed, pre-recorded sessions
  - Tutors were available during the sessions to help students
  - We kept the sessions online to allow students to rewatch the content
- Option 3: Continuous access to pre-recorded sessions
Remote Supervision and Support of Students

- Nine tutors were distributed to 80 students and were the first point of contact for the students
- We created chat channels (Slack) for every session to enable the students to ask questions
- Used video meetings (Zoom) to enable 1-1 or 1-many communication between the students and tutors
- Students were required to post summaries of video calls so other students can benefit from the results
Semi-Automated Code Review Process

• We used pull requests to correct the students’ homework
• We created a bot that uses static code analysis to review Swift code
  • Integrated into our existing infrastructure using BitBucket
  • Build using server-side Swift and the SwiftLint framework
• The tutor provides manual feedback after the bot has approved the pull request
Access to the Required Hardware

• 55 of the 76 student participants did own or had access to a computer running macOS

• We supported two tutors among nine who were only using virtual machines with a MacBook

• We repurposed our iMac laboratory by relying on a remote desktop connection to the machines

• All machines were placed inside a virtual private network (VPN) that students connected to before accessing the macOS machines
Results and Discussion

• All students could participate, had access a macOS machine, and it was perceived positive that students could rewatch the sessions at any time

• Some students hesitated to ask questions in the channels with all students

• We Conducted a survey one week after the Swift programming course and received 41 answers from students and six answers from tutors

82% strongly agreed or agreed compared to 76% the year before

75% strongly agreed or agreed compared to 69% the year before
Conclusion and Future Work

- We will keep using the semi-automated review process and improve its functionality.
- Due to the increasing number of COVID-19 cases, we will also conduct the next Swift Bootcamp virtually.
- The prerecorded sessions can be reused and slightly adapted for the next Swift Bootcamp.
- We want to use a forum-based platform for students to answer questions and provide feedback.
- We will reuse the infrastructure setup from the last semester to provide access to macOS machines.
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