

Bachelor's Thesis  
**Shape-based Image Editor**

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The coronavirus outbreak in 2020 strongly changed the way how teaching is performed at universities. Most classes switched to an online teaching mode – including digital exams. While digital exams may sometimes even prove more useful than “paper exams”, for example by providing syntax highlight when writing source code, they also have certain downsides.

The Institute for System Software has developed the software Xamined that can be used to perform online exams. Unfortunately, the tool (similar to nearly all other tools) restricts possible answers to either multiple choice or free text answers, even though many “traditional” exams relied on hand-drawn images.

The goal of this thesis is to develop a web component that can be used to produce simple images. Written in JavaScript, using a low-level framework such as D3.js, it should allow to create small SVG graphics that consist of various visualization primitives (shapes) such as rectangles, circles, texts and arrows. Above the canvas, a toolbar should allow the user to place new shapes on the canvas. Once placed, the user should be able to select a shape / text by clicking on it. Multiple objects should be selectable by dragging the pressed mouse across them (i.e., rectangular select). Selected objects should then be modifiable - for example moving, resizing, or deleting them.

It is *not* part of this to incorporate the web component into Xamined. Nevertheless, the student is expected to strive for easy portability of the component, for example such that it can be imported into other web projects as a simple script.

To evaluate the tool, the thesis advisor will provide example exam question that expect a drawing as answer. The component should be used to create these expected drawings to evaluate if the current state of the image editor provides enough features, flexibility, and usability.

Modalities:

The progress of the project should be discussed at least every two weeks with the advisor. A time schedule and a milestone plan must be set up within the first 3 weeks. It should be continuously refined and monitored to make sure that the thesis will be completed in time. The final version of the image editor has to be finished before end of May 2021 (to make it available for the exams) and thesis must be submitted not later than 01.08.2021.