## Optimization process

The database structure we set up the standard way, with each table being one as specified in the milestone1 file. First primary and foreign keys where created during initialization. This would take hours to create so foreign keys were deleted and the primary keys only added after all the data had been loaded. The queries were designed to work disregarding runtime. After creating some queries we decided to check which impact indices would have on the runtime. As it turned out primary keys were enough. Adding indices to the existing tables made no difference on the runtime of the queries.

The step which took us most of the time and gave us substantial results was rewriting the queries to optimize their runtime. The biggest improvements where gained with limiting the amount of joins and major overhauls of the queries which were very inefficient.

The last step we took was creating materialized views. As we only have a limited amount of time to create materialized views and indexes we had to carefully evaluate which ones we wanted to create. We have created multiple materialized views for query 1, as this query is executed 100 times. The first one was specifically for query 1 and could not be reused for any other query. It make query 1 run in 3ms but took a lot of time to create. The second version only filters CourseRegistrations on the grades >= 5, plus an index on grades on this views. This view is reusable as it can speed up other views. As query 2,3 and 7 all use (non)active students we decided to make a view with the active students and possible their GPA’s added. Multiple version have been created with the first ones containing bugs which were only found days after the creation of the view. The challenge with this view was getting it created within the 5minutes given.

## Chosen optimizations

Documentation **(20 pt)**

A. A description (max. 1/2 page) on the followed optimization process, in steps (10 pt)

B. A description (max. 1/2 page) on the chosen optimizations, the space required from each,

and performance experiments with/without these optimizations (10 pt).

The documentation will be saved in a file documentation.pdf, and included in the git repository.

Be clear and concise.