

# E-Assessment

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## Motivation

Our project concentrates on development of a system for E-assessment that would cover the whole process of study: from homework to exams. Now a lot of software is used for homework during the semester, but exams are still pen and paper. It is important to change the workflow in such a way that students would use the same software tools for all assignments, tests and exams, because work during the semester plays a significant role in exam preparation.

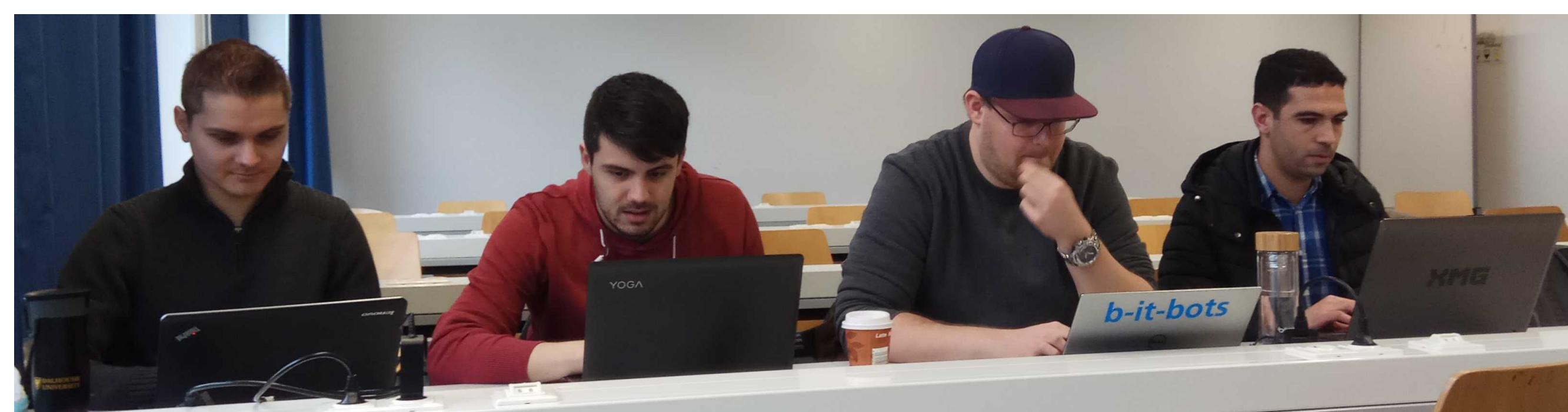
## Autograding

We focus on automated grading of the answers those contain the following:

- program code – Unit tests
- formulas
- short text
- pictures (in the later versions)

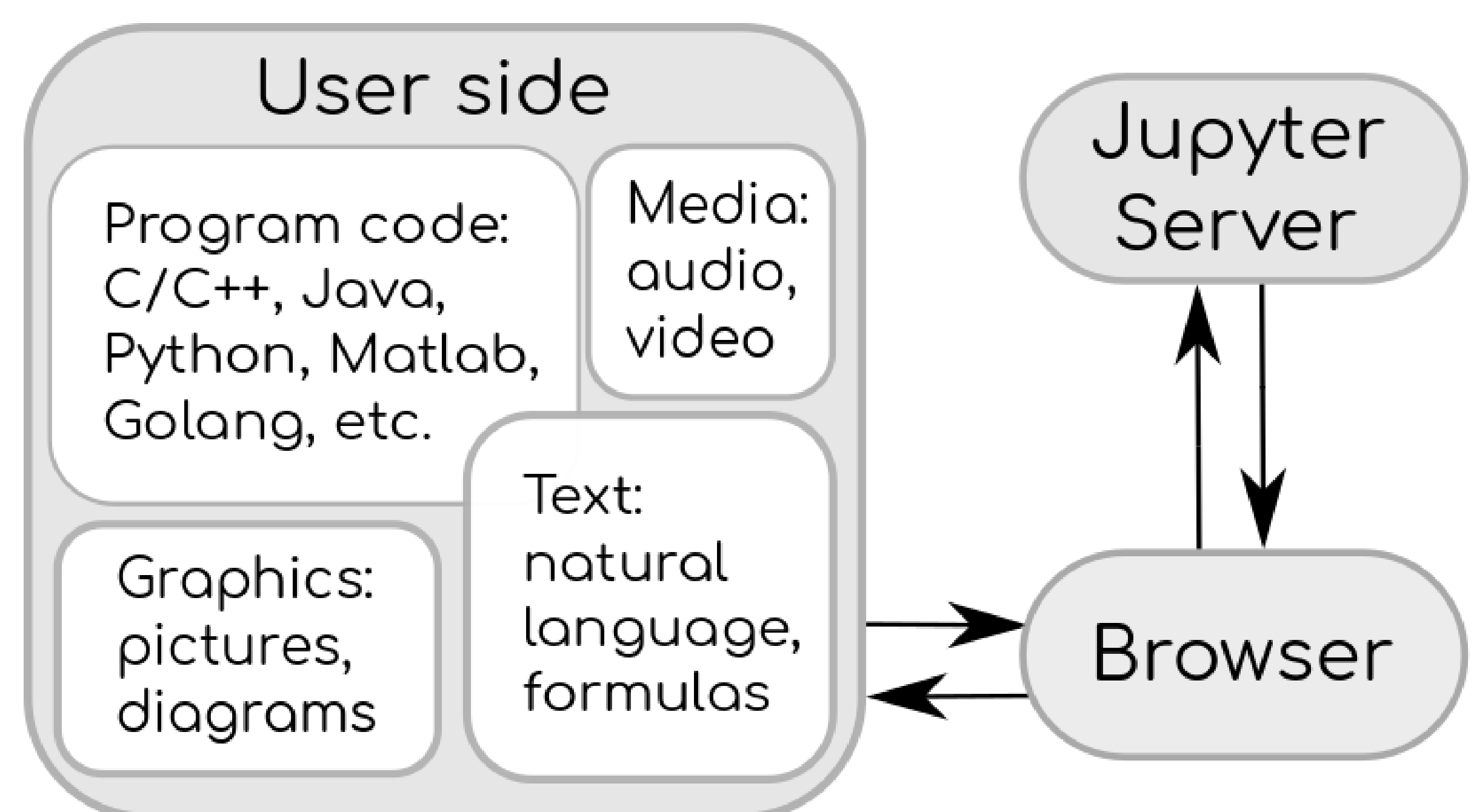


Formulas checking is easy to generalize and automate, but text and pictures grading are harder tasks. Automated short answer grading (ASAG) is a form of automated grading along with automated essay and fill the gap gradings. This answer type normally from one sentence to one paragraph long. In general one is concerned neither with writing style nor with spelling or grammar in ASAG. However, we are going to add a feature that would allow the professor who conducts a test to set the strictness of the evaluation: set if the answers with misspelled words, especially specific terms, should be accepted. The teacher should also be able to estimate how large should be the range of synonyms that the student can use.



## Software

The system will be integrated into an open-source system for creating and grading assignments "nbgrader"[1],[2], "Jupyter Notebook"[3] and other "Jupyter Notebook-compatible libraries". "Jupyter Notebook" is a web-based application that one can use to create textual and programming documents – the assignments in our case. In the figure below you can find the workflow for the its usage:



"nbgrader" allows to choose if the assignment can be graded manually or automatically. Now the system allows only code assignments autograding, but we are going to extend it in such a way that it is possible to autograde formulas, natural language answers and pictures as well. An example of "nbgrader" assignment in Jupyter notebook is shown below:



## References

- 1 <https://github.com/jupyter/nbgrader>
- 2 <https://nbgrader.readthedocs.io/en/stable/>
- 3 <http://jupyter.org/>

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