

Markus, an open-source web application to annotate student papers on-line

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Some challenging questions

Motivation

How to **efficiently manage** and **grade** students' papers (e.g. lab. works, projects, ...) ?

- Submissions
- Assessment
- Feedback
- Distribution
- Record keeping

Major issues

- Huge **loads** of papers (300-900 students per course)
- **Heterogeneity** of the teachers team
- Digitalization

Limits of the previous workflows

Teachers' viewpoint :

- **Loads** of students' submissions
- Difficulty to **harmonize** assessment criteria between graders
- Paper lifecycle
 - Tons of papers that will never be assessed
 - When do you give the papers back to the students ?
- e-mail lifecycle
 - Wrong recipients
 - Broken files
 - Works only for small to medium class sizes

Limits of the previous workflows

Students' viewpoint :

- Difficulties for getting **feedback** on submitted papers
- Paper lifecycle
 - Loss of reports before the end of the semester
 - How to **share** the graded paper with one's comrades ?
- e-mail lifecycle
 - Errors in the recipients
 - One e-mail among so many others

MarkUs, a web application to assess students' work

MarkUs? Mark us!

MarkUs is :

- A **free software**
- A **web** application, thus cross-platform
- Aimed at grading students' papers
- **Versioning** of every submitted document
- **Direct annotation** of documents by graders
- Decrease of the time spent on **assessment**

MarkUs : key facts

MarkUs, a free software to assess students' works

- 2006 : Beginning of the **development** at University of Toronto (UoT)
- 2009 :
 - **Deployment** at UoT
 - École Centrale de Nantes (ECN) **joins** the development team
- 2010 : **Deployment** at ECN and University of Waterloo
- 2011 : **Dissemination**
 - Special mention Prize at “Trophées des Technologies Educatives” of the french “Salon de l'Education / Educative”
 - Talks at various french meetings
 - Additional french universities and engineering school begin testing MarkUs

Technical requirements

How can students/graders/instructors use MarkUs?

The **only** requirement is to open a **web browser** !

How can systems engineers install MarkUs?

- Install Ruby on Rails
- Install Subversion
- Install MarkUs thanks to the code available publicly

→ **No cost** other than the time spent on the installation !

Roles in MarkUs

Instructor

The course administrator creates and configures the assignments (deadline, marking scheme, ...).

Grader

Teacher assistants grade students' work following the instructor's guidelines.

Student

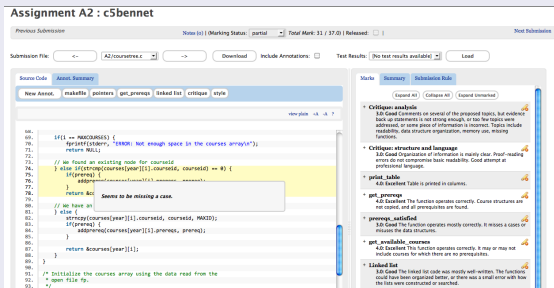
Students submit their work and can view the results from their previous submissions.

MarkUs' features

Pedagogical improvement (instructor and graders)

Annotation feature

- Source code (with syntax highlighting)
- Images
- PDF



MarkUs' features

Pedagogical improvement (teachers)

- Follow the **marking scheme** to grade the papers
- Use existing annotations (source code, images and PDF) or create new ones
- Multiple graders for the same paper



FIGURE: Criteria definition

MarkUs' features

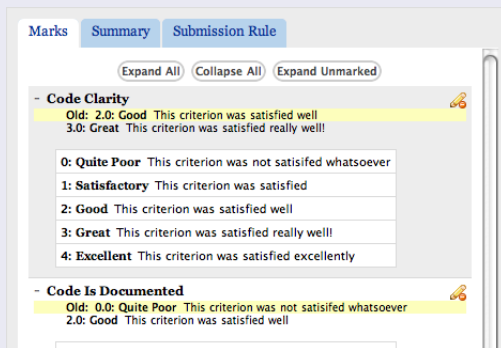
Pedagogical improvement (teachers)

- Management of multiple assignments in the context of one MarkUs instance per course
- Automatic management of **deadlines** with configurable penalties for late submission
- Possibility to view and grade a **previous** version of the work

MarkUs' features

Pedagogical improvement (student)

- Group creation **depending on the assignment**
- Comments and annotations export
- Improved and faster feedback
- Comments can be checked on-line **anytime anywhere**



Demo

Let us give you a short demo of the software. . .

MarkUs : key figures

MarkUs, a free software to assess students' works

- ECN :
 - Two CS courses of the common engineering core every year + CS major
 - **750 students impacted** every year
 - Up to 350 students per course
- UoT :
 - 8 different courses in CS and Engineering
 - A total of 1200 students impacted
 - Up to **650 students** per course
- UoW :
 - Two large courses every term
 - More than **800 students impacted** every term
- Since 2008 : contribution of **more than 45 undergraduate students**

Why teachers enjoy MarkUs :

- Management of a **large number** of submissions (previous experiments went up to 900 students)
- **Centralized** and **versioned** submission of the papers
- **Decrease of the time** required for grading the papers : between 14% and 50%
- **Decrease of the number of late submissions** : drop from 15-20% to 5-10%
- **Dematerialization**
- Supports **nomadism**

Why students enjoy MarkUs

- A **unique** tool for submitting and getting the assessment results
- Improvement of the **delay** to get the assessment results
- **Decrease of the number of papers** whose results and feedback are given after the final exam
- **Permanent** access to previous works annotated by teachers

MarkUs' beneficial effects

Impact on the teaching activity :

- Improved **logistic** management
- **Unification** of marking criteria
- Grading becomes quite **fun**

MarkUs' beneficial effects

Impact on the learning process :

- Better respect of **deadlines** by students
- Every **student** gets access to the feedback given on his work
- **More interest** in the comments and annotations left by teachers
- **Prompt feedback** allows to take comments into account for preparing the next assignments.

Conclusion

Aim

How to improve and streamline the grading workflow ?

MarkUs

- **Free** software
- Annotation of **source code**, **.PDF** and **images**
- Easy to handle
- Costs only the time necessary to install and maintain the running instances
- Towards the creation of **virtuous circles** : users → contributors → mentors

Improvements to come

Widen the use of MarkUs

- Incorporate an **automatic testing framework**
- Integrate a **plagiarism detection tool** into the application
- Extend the use of MarkUs to meet the needs of **research peer-reviewing** processes

More info

Links and contacts

- Project website : <http://markusproject.org>
- Try the software on-line : <http://markusproject.org/admin-demo>
- Source : <https://github.com/MarkUsProject/Markus>
- EAT-TICE Ecole Centrale de Nantes website :
<http://eat-tice.ec-nantes.fr>
- IRC channel : [#markus](http://irc.freenode.net) sur irc.freenode.net
- Mailing list : markus-dev@cs.toronto.edu