

# Crowdmark Collaborative Exam Marking

Gord Boyer and John Bate  
Department of Computer Science  
University of Manitoba  
Winnipeg, MB R3T 2N2  
[Gord.Boyer@cs.umanitoba.ca](mailto:Gord.Boyer@cs.umanitoba.ca)

## Abstract

Exams in large, multi-section programming courses involve paper exams with hand-written answers. These questions must be read and graded by humans, of course. Marking paper exams is a team effort, with each team member responsible for marking certain questions on every paper.

This approach presents several practical problems. First is the logistical problem of passing stacks of papers between team members. Having to accommodate travel plans and differing schedules of the team members can be quite challenging. Second is the tedium of shuffling through hundreds of papers finding the pages you are marking. Third is the effort required to collate all the marks and enter them into, for example, an LMS.

Crowdmark addresses the problems described above by eliminating paper. It is also tightly integrated with the U of M LMS (UM Learn). In this demonstration I will show the entire process of using Crowdmark to mark a paper exam.

# 1 Introduction

The 2011 Canadian Open Mathematics Challenge involved the grading of some 5000 papers, each 14 pages long, by a team of volunteers [1]. Volunteer markers were responsible for marking certain questions on a large number of papers. This created several problems; first is the logistical problem of getting the papers to the markers; second is the physical act of shuffling papers to find the questions to be marked; and lastly, the tedious and error-prone job of compiling the individual marks from the papers and entering them into a master list.

For the 2012 Mathematics Challenge, a prototype collaborative system was built by University of Toronto Mathematics Professor James Colliander and graduate student Martin Muñoz, in partnership with the Canadian Mathematical Society and eight universities. Using this prototype, the 2012 Challenge was graded in half the time compared to the previous year. From this prototype, the Crowdmark platform was developed.

Crowdmark is integrated with the Brightspace Learning Management System from D2L. Courses, student class lists with metadata, and marking team members can be imported from Brightspace to Crowdmark. Graded assessments are exportable from Crowdmark to the Brightspace gradebook. Crowdmark sends individualized emails with links for students to access their assignments and grades. [2] The University of Manitoba's LMS, UM Learn, is hosted by Brightspace.

Section 2 of this paper describes the process for using Crowdmark to administer an exam. It is meant to accompany the demonstration of the process. Section 3 presents a description of the benefits of using Crowdmark, including a rough estimate of time saved. Section 4 gives a summary of the benefits seen from Crowdmark.

## 2 Using Crowdmark

A step-by-step description of using Crowdmark is presented here.

### 2.1 Sign in to Crowdmark

Go to Crowdmark (<https://crowdmark.com/>). The first time you sign in, click the SIGN IN button; you are taken to a sign-in page. By selecting your school from the drop-down list, you can sign in using your school's LMS. In future sign-ins, you will go directly to the sign-in for your LMS. Sign in using your usual credentials.

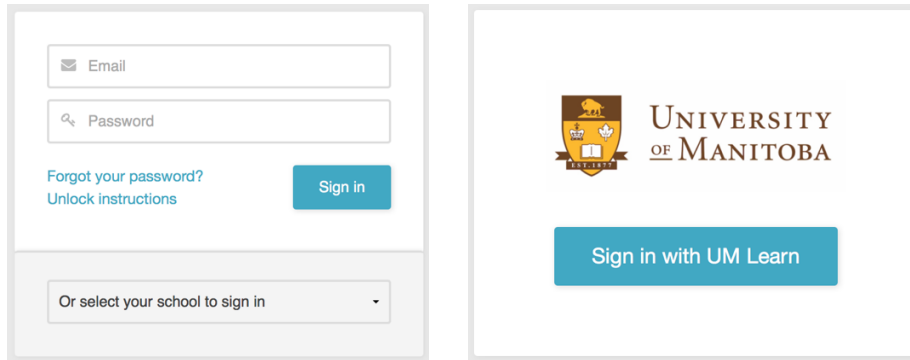


Figure 1: Signing in

## 2.2 Set up Crowdmark for your course

Click ***Import a course***; you can select from any of the courses for which you are listed as the Instructor. Finally, click ***Import course***.

## 2.3 Create your exam

Create your exam as you normally would, but with the following restrictions:

- Leave 1.5” (3.8 cm) blank at the top of every page.
- Single sided is preferable for scanning later.

Page 1 must be a cover page with no questions on it. Provide blanks for student name, number, and userid. Do not ask for identification on any other page.

A few special instructions are advisable:

- Don't write in the top space
- Backs of pages will not be marked
- Write darkly

## 2.4 Create a printable file

Save a PDF version of your exam. Go to your course and click ***Create assessment***. Provide a name for the assessment. The next step is to choose the type of assessment. Choose an ***Administered*** assessment for one that is monitored in person.

Next, upload your pdf exam paper using drag-and-drop or by browsing. Be sure to unselect double sided printing. Preview the exam template to ensure the identifying information is visible, and the correct number of pages is produced.

The next step is to define questions. One question per page and 10 points per question is the default, but you can add more questions and change the points.

Next, enroll students for the exam. You can import students from the LMS class list. You can delete inappropriate ones, like TAs or test students. The last step is to generate a few extra exams, just in case. Finally, click **Generate PDF** and download the file.

00AD9E3F-015A-4B82-A04D-AC48A3686762  
test-assessment-44800  
#1 1 of 4

**COMP1500: Computing: Ideas and Innovation** **Midterm In Class Exam**  
**2018 March 2** **Time: 45 minutes**

Name: \_\_\_\_\_  
Student Number: \_\_\_\_\_  
UMnetID: \_\_\_\_\_

**Instructions:**

1. Write your Name, Student Number and UMnetID above. DO NOT write this information on any other page.
2. DO NOT WRITE IN THE TOP MARGIN OF ANY PAGE. This space is needed for Crowdmark identification of your paper.
3. This paper will be scanned, so WRITE DARKLY.
4. **Answer all questions on this paper. DO NOT ANSWER QUESTIONS ON THE BACK OF THE PAGES. THESE WILL NOT BE SEEN BY THE MARKER.**
  - For multiple choice questions, circle the letter of the **best** or most complete choice.
  - For short answer questions, write your answer in the space provided.
5. You will find a C1500 Mark 3 Assembly Language Guide along with your midterm; ask if you don't have one. You may **not** use your own copy.
6. No other aids (such as calculators or cell phones) are permitted.
7. If you require rough workspace, please use the back of the pages.
8. You have 45 minutes to complete the exam.

Figure 2: Exam cover page with Crowdmark identification

## 2.5 Print the exam

The PDF must be printed using single-sided printing, with each group of N pages stapled together as a separate "booklet". This is called **subset stapling** in the Department's printer/copier/scanner (currently a Kyocera TASKalfa 6501i).

## 2.6 Administer the exam

No special procedures are needed to administer the exam. It is a good idea to announce to the students not to make any marks in the top margin, and to write darkly (for better scanning).

## 2.7 Scan the exams

This is the most labour intensive part of the process. The booklets must be unstapled and scanned. We have found simply lopping off the stapled corner of the booklet with a paper cutter is easiest, and it does not affect the ability of the Kyocera to scan multiple pages.

The Kyocera also supports scanning documents directly to a file in your Unix home directory, rather than sending it via email. This enables larger batches of exams to be scanned.

## 2.8 Upload the scanned exams

Once the scanning is complete, the scans are uploaded to Crowdmark. Click **Upload booklets** and drag-and-drop the files. If the QR code cannot be read, an error will be reported for that page. You can fix this by manually entering the UUID code, found next to the QR code in the scanned image.

## 2.9 Matching exams to students

You need to match the exam numbers to the students in the class list. Click **Match booklets**. You are presented with the cover page of each booklet in turn. You can perform matches by typing student metadata (name, student number or userid); autocomplete will quickly narrow down the possibilities. If the student's writing is completely illegible, you can skip over until you have a chance to view the original paper.

## 2.10 Assembling a marking team

The **Team** page is used to add markers to your team. You can invite markers via e-mail, or import them from the LMS. *Graders* cannot access student information, but *Facilitators* can.

## 2.11 Marking the exams

The **Dashboard** is the starting point. Pick the question to be graded. You will be presented with that question on each paper, in turn. No more handling exams or flipping pages.

Lots of tools exist to help speed the marking. The tools have both icons and keyboard shortcuts. Listed below are some tools we have found useful, and their shortcuts:

- Type x, then click to place an X.
- Type c, then click to place a checkmark.
- Type q, then click to place a question mark.
- Type v, then click and type to place a comment. Shift-Enter to end the comment. The comment will be added to a Comment library, which can then be dragged onto the paper.
- Type a number and Enter to assign a mark.
- Enter moves to the same question for the next student, until that question is completely marked.

Comments can also have marks assigned to them. When the comment is dragged onto the paper, its assigned mark is added to the mark for that question.

## 2.12 Uploading results and sending exams to students

To upload the marks, go to *Results* and click *Export grades to UM Learn*. The grades are uploaded to the gradebook tool. This is a huge time-saver. No more adding up questions, handling exams, searching for students, entering grades, etc.

To send feedback to the students, click *Send grades to students*. The students receive an e-mail with a link to the graded exam, along with summary statistics for the class.

## 3 Benefits

The chief benefit from the instructor's point of view is the saving of time. Avoiding repetitive stress injuries to the writing hand certainly is another benefit. For the students, the benefits include faster and better-quality feedback.

### 3.1 Estimate of time savings

Dr. Bate is the first one in the Department to adopt Crowdmark and has provided a rough estimate of the time savings based on an exam with 350 papers. The saving in time is about 15.5 hours. This analysis assumes that the actual marking takes the same time as manual marking; so far, our experience has shown a significant saving in this task as well.

Task	Time spent (minutes)	
	Crowdmark	Manual
Setting up the course	2	0
Creating the exam	10	0
Creating the printable file	2	0
Printing the exam	same	same
Writing the exam	same	same
Scanning and uploading	135	0
Matching	60	0
Handling of paper	0	420
Actual marking	same	same
Adding and recording	0	720
<b>Total</b>	<b>209</b>	<b>1140</b>

Table 1: Estimate of time to perform tasks for an exam

### 3.2 Other benefits

Prior to Crowdmark, students were generally not able to see their marked exams. This is primarily a logistical issue, but many students want to understand why they didn't get as good a grade as they expected ("I had an 'A' going into the exam."). As a courtesy, some

instructors let students look at their papers, but the only formal process for viewing their exam is to file a grade appeal. This is not a satisfactory solution for these students, firstly because of the non-refundable fee, and secondly, they for the most part are not appealing for a better grade, but just want to see where they made mistakes. Crowdmark solves this problem by giving all students access to their marked exam. The Mathematics department has had more experience with Crowdmark, and they have found releasing the exam results has drastically reduced the number of appeals. It's the proverbial win-win; less paperwork for us, better feedback for the students.

## **4 Summary**

The Crowdmark collaborative exam marking platform offers considerable advantages in the marking of large exams. The extra work involved in scanning and matching exam papers to students is insignificant compared to the savings seen by eliminating paper passing and shuffling. Students also receive the benefit of quicker and higher quality feedback. It also provides the opportunity for students to receive feedback on their final exams, feedback that was previously not available, and which eliminates the need to use the grade appeal mechanism to view their exams.

## **References**

- [1] Crowdmark. 2018. Our Story. Retrieved March 15, 2018 from <https://crowdmark.com/our-story/> .
- [2] Crowdmark. 2018. How does Crowdmark work with Brightspace? Retrieved March 16, 2018 from <https://crowdmark.desk.com/customer/en/portal/articles/2564409-how-does-crowdmark-work-with-brightspace-> .