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Automated Grading Tools for Compter Programming

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Teaching Practice & Need it Addresses

This teaching practice addresses **automated grading tools for computer programming** assignments. Similar tools are in use at UNLV for other disciplines (e.g., TurnItIn). This is the first use of automation specifically for grading computer programs. This tool was initially applied to first and second programming courses (CS 135, 10 sections and CS 202, 8 sections) in Fall 2021.

Evidence it Benefits Students

Benefits to students are both direct and indirect.

Direct Benefits:

- A direct benefit includes very ***fast scoring feedback*** scoring (~5-10 minutes).
- If the student does not receive the expected score, the student can ***correct and re-submit*** until the final due date.
- If the cause of an issue is not clear, the student can ask for assistance based on the feedback which ***allows the instructor or TA to provide more specific assistance***. Again, the student can correct and re-submit.

Indirect Benefits:

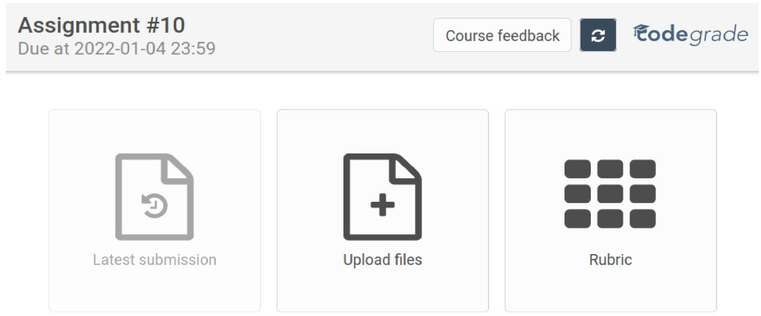
- An indirect benefit is that the instructor or TA can ***spend more time helping students*** and less time scoring assignments.
- Another key benefit includes ***scoring consistency*** across different instructors/TAs and different sections. Based on a CS Masters Thesis (SP22) using a ~300 student test, the Levene's test for homogeneity of variance showed a large statistical difference in variance for manual-based scoring.

Initial Learning Curve

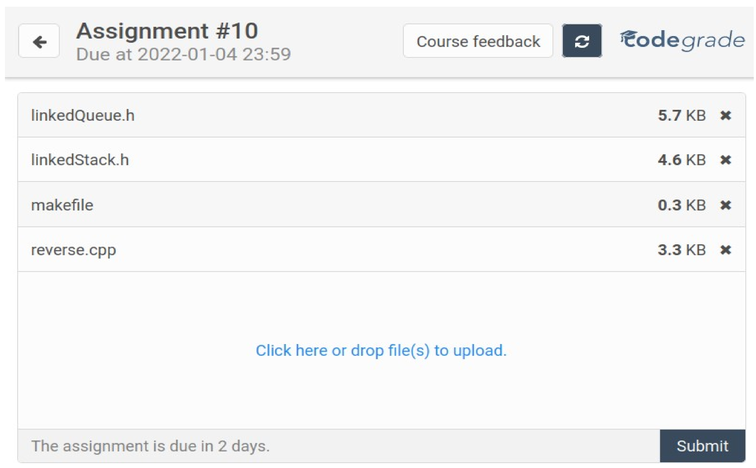
To be most effective, programming projects must be developed so they can be tested in stages. Using the tool requires a fully developed solution prior to issuance of the assignment. This requires a more up-front effort for the instructor.

Resources & Where to Find Them

The **codeGrade** tool is integrated into the UNLV Canvas system (listed under External Tool). However, it can only be used to score computer programs (any programming language).



Assignment Submission Page (step 1)



Assignment Submission Upload (step 2)

References/Acknowledgments

Little formal research has been done regarding the specific benefits and impacts of automated program scoring. As such, work is being initiated locally to more fully evaluate.

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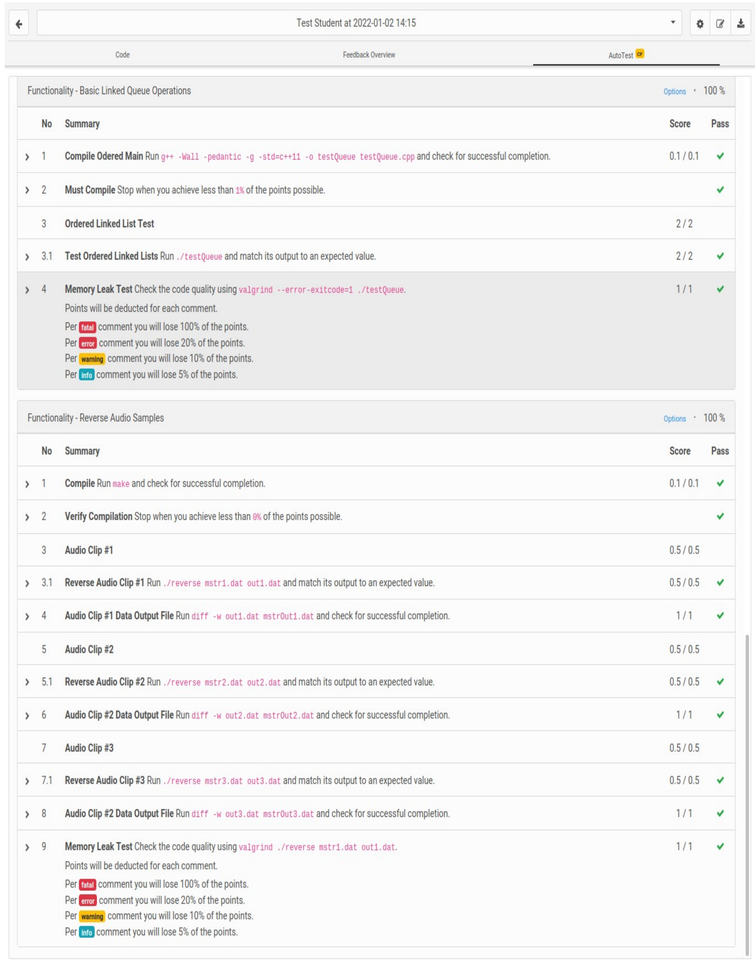

Assignment Scoring Example (step 3)

Best Teaching Practices Expo 2022