



Spring 2020

Waterloo Engineering Competition

July 11, 2020

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PROGRAMMING

Competitor Information Package



WATERLOO
ENGINEERING SOCIETY

SCHEDULE

The schedule of the Spring 2020 Programming competition is as follows:

Time*	Activity	Platform
08:45 – 08:55	Sign-In	WebEx Meetings
09:00 – 09:25	Welcome to WEC	WebEx Meetings
09:30 – 09:55	Programming Introduction & Questions Period	WebEx Meetings
10:00 – 16:00	Design & Build	Self-Administered / Slack
16:00 – 16:55	Break	N/A
17:00 – 18:55	Presentations & Judging	WebEx Meetings
19:00 – 19:30	Judges Feedback & Awards	WebEx Meetings

* Times are approximate. Events may be delayed on the day of the competition, which will be communicated in the WEC-S20 Slack Workspace.

GENERAL RULES & GUIDELINES

1. After the initial welcome ceremony, the competitors will split off into their respective competitions and be presented with their problem spaces and design challenges. Please try to ask all questions during the 15-minute question period following the reveal of the design challenge so that you have full attention of the WEC organizers. Beyond the question period, if questions arise, you may ask them in the **Slack workplace: wec-s20.slack.com**. Your _____@uwaterloo.ca email should give you access, or you may use this link: https://join.slack.com/t/wec-s20/shared_invite/zt-fmycnvxv-eN5skSsaROkhELGevT~maw.
2. Competition-related questions will only be answered in the *#programming* channel to ensure fairness. Teams are expected to monitor the WEC Slack Workspace for updates about the event.
3. For personal emergencies or sensitive questions, please contact the Programming Directors, Kaveen Kumarasinghe and Trent Stauffer, or the WEC Commissioner, Tom Yan.
4. Project submissions must be original solutions conducted by the competitors during the allocated competition times with all sources correctly cited.
5. Time remaining in the Design stage will be announced to competitors at the 3-hour, 1-hour, 30-minute, and 10-minute marks.
6. All deliverables must be submitted to the submission dropbox prior to the end of the Design & Build stage.
7. If the discovery of a rule violation occurs during the competition, immediately following the competition, competitors have 24 hours to initial an appeal for the decision. If the discovery of a rule violation occurs after the competition, the competitors will be immediately notified via email and will have three (3) days to appeal the decision. Should a competitor fall into one of these situations, the competitor should contact the WEC Commissioner.

VIRTUAL WEC INFORMATION & GUIDELINES

The following rules and guidelines are to be followed by teams, as WEC is online this term:

1. Teams are expected to have an open line of communication with the WEC organizers and respond to messages in a timely manner throughout the duration of the event.
2. The Welcome and Competition Introductions shall be hosted via a WebEx Meetings call. The joining information will be emailed to the competitors and posted in the *#announcements* and *#programming* channels in the Slack Workspace.
3. During the Design stage, teams may use any video or voice conferencing platform they are comfortable with. Please ensure that the platform supports screen sharing to promote collaboration. The organizers will be active on Slack for any support or questions needed. If a voice/video call with the Director is required, the Director may join the team's ongoing call, or they can set up a new call on a platform of their choosing.
4. During the Presentations & Judging stage, the judges will be on a WebEx Meetings call for the duration of the stage. Teams shall join and leave the call as their presentation time slots end and finish, respectively.

SCENARIO

In our ever-changing modern world, we have grown accustomed to being able to access information at any time, anywhere. We can obtain facts, data, news, and much more with the click of a button. However, with recent events, we have seen that even with all this accessibility, we are not able to fully stay connected virtually with each other. Schools have struggled to make a switch to virtual instruction, hospitals have struggled to stay connected with patients from a distance, and various other industries are suffering as a result of a lack of communication infrastructure during a time where we can not interact in person.

OBJECTIVE, REQUIREMENTS & CONSTRAINTS

Your objective will follow this scenario and focus on a specific problem: **online education**. At times like this, it is vital that students can get the education material that they need at a moment's notice, especially when we can not drop-in to physical locations in universities, libraries, and other places to get help. Furthermore, not all content that you see on a google search is trusted! You will be focusing on creating a mini-search engine, where students can specifically search for trusted educational content. (NOTE: This is not like Google, or Yahoo, etc. because this search engine will only return educational content from a plethora of trusted sources such as Khan Academy and others).

Example:

If a user inputs the search query "triple integrals" the search engine should return a set of trusted educational content that relates to triple integrals!

For this competition, we are trying to deviate away from the norms of pure mathematical based programming competitions and have you actually create something realistic, using programming paradigms (like the usage of APIs) that are used in the real world. Depending on your skill level, a polished solution may be difficult to complete in the time given, but keep in mind that a working prototype is only one area of evaluation.

DELIVERABLES

Teams will make a **10-minute presentation** for a team of university professors looking to invest in more reliable and targeted search engines. Please review the marking scheme on the last page of this package. At the end of the design and build stage, each team is required to submit the following items to a dropbox that will be sent in the Slack *#programming* channel:

1. Source Code: the code must be uploaded to the repository announced in the *#programming* Slack channel to ensure no changes are made after submission.

2. Presentation: a short slideshow presentation about the search engine, outlining the features, the APIs that were used, and the technologies used.

PROCEDURAL RULES

The following rules must be followed during the design and build stages of the competition. Any teams in violation of these rules may be disqualified at the discretion of the WEC staff.

1. Teams have six (6) hours to complete the design and development of their prototypes. Afterwards, teams are not permitted to make any changes to the design or presentation. Late submissions WILL NOT be accepted, and the team will be disqualified.
2. Teams may decide how to complete the solution collaboratively, but no external assistance is permitted, aside from mentors.
3. Mentors will be present during the competition to assist you, but they are not allowed to code for you or provide you with any code snippets. They are simply for technical/ideation guidance and to help you troubleshoot or get started.
4. Prior to the end of the Design stage, all deliverables listed in the Deliverables section must be submitted to the dropbox with file names in the following format:
 - Source Code: "Team#_WEC-S20-Programming_Code"
 - Presentation: "Team#_WEC-S20-Programming_Presentation"
5. Teams must ready to present with all the previously listed deliverables arranged in a manner for presentation. The judges will have a copy as well in case of technical difficulties; however, teams are responsible for showcasing their solution via screenshare. Teams may decide how to best present their project seamlessly during their time slot.
6. After the team finishes their presentation session, they may take a break while other teams are presenting. The team should be ready to join back into the meeting once all teams have presented for the judges' feedback and announcement of winners.

PRESENTATIONS & JUDGING

Teams will create and present a **7-minute presentation** a panel of three judges. Order of the presentation will be determined randomly and will be announced 30 minutes prior to the Judging stage's start time. Teams will be cut off immediately at the 10-minute mark. The presentation will be followed by a **7-minute question period** where the judges can ask questions to the team. The question period will be cut off immediately at the 10-minute mark. Parts of the presentation and question period should be shared equally between the team members to score full points. After the question period, the presenting team shall leave, and judges will be given a **5-minute consolidation/preparation period** for the next team that is presenting. During this time, the next team may join the meeting call to prepare their presentation.

After all teams have presented, the judges will be given 15 minutes to deliberate among themselves to compare evaluations and determine winners. The first-place team will represent the University of Waterloo at the 2021 Ontario Engineering Competition (Programming) at Queen's University in Winter 2021. If the first-place team is unable to attend, the second-place team shall take their place

RESOURCES

Your "search engine" can be in the form of anything you desire. It can be in the form of a console application (e.g: you type something into the terminal, and it returns output), it can be in the form of a website, or even in the form of a desktop or mobile application. Keep in mind that more complex integrations will receive higher marks.

You may only use free APIs for your search engine; anything that requires you to pay a subscription fee, or a one-time fee, is not allowed and you will be disqualified from the competition if we find such APIs. Here are some examples of free APIs you can use to get started:

- Khan Academy REST API:

(<https://www.programmableweb.com/api/khan-academy-rest-api-v1>)

- Google Custom Search API:

(https://developers.google.com/custom-search/v1/using_rest) An interesting use case is to search for the user's educational query using this API and then return results only from trusted educational sources!

You are encouraged to investigate more and research to find other useful APIs!

MARKING SCHEME

Criteria	Nonexistent (0 pts)	Inadequate (2 pts)	Moderate (5 pts)	Good (8 pts)	Excellent (10 pts)
Design Methodology	No clear approach was used or described in the presentation.	Some form of a design approach was used to create the solution.	Some elements of software design/engineering design thinking were used	Most key elements of software design and engineering design thinking were used.	Excellent software design and engineering thinking methods were applied to create the solution.
Technical Complexity	No code was provided	Some attempt was made at coding but code does not entirely work as intended.	Code is basic but works as intended.	Code is decently complex with multiple components integrated. Code works as intended.	Multiple pieces of complex code were created/integrated with no issues. Calls to a plethora of APIs. Code is not only a console-based application.
Working Demo	Demonstration is poor and does not work at all.	Demonstration works but is inhibited by bugs.	Demonstration performs well and conveys the original project idea. Bugs do not inhibit the demo.	Demonstration is smooth and project idea is easy to notice. Demo is impressive and representative of well-thought-out design.	Demonstration works flawlessly, is repeatable, and impressive. Demonstration is clear and presents the underlying design principles.
Presentation	Presentation is confusing or non-existent.	Presentation is unclear, leaves many questions, and appears to be prepared last minute.	Presentation reflects that it was planned beforehand. Design idea and demo are presented in a clear and concise manner.	Presentation is of high quality and well-organized. Underlying design principles are evident. Presentation is convincing and demonstrates that learning was present during the Hackathon.	Presentation is convincing and summarizes learnings, troubles, and deep understanding of technology used. Presentation is well rehearsed, demonstrate contributions by individual members, and reflect how the team was able to work effectively together.