



Date: 20 October 2018

Time: 00:00:00 UTC – 23:59:59 UTC

More Info: [www.ieeextreme.org](http://www.ieeextreme.org)

## IEEEXtreme 12.0 Competition Rules

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### Description

IEEEXtreme is a global challenge in which teams of student members, supported by an IEEE Student Branch, advised and proctored by an IEEE Member, compete in a 24-hour time span, starting on October 20, 2018 at 00:00 UTC and ending at 23:59:59 UTC, against each other to solve a set of programming problems.

The competition was created to:

- Provide IEEE Student Members with a new and interesting activity
- Give IEEE Student Members a challenge to embrace teamwork - an important skill to develop for career success
- Increase the number of IEEE Student activities with a focus on the computer, programming and information technology fields

Other benefits include providing Student Branches with ways to get IEEE Student Members involved in local activity in a fun and engaging way.

### Sponsor

The IEEEXtreme Programming Competition is hosted by The Institute of Electrical and Electronics Engineers, Incorporated, 445 Hoes Lane, Piscataway, New Jersey, USA, 08854 ("Sponsor" or "IEEE"). It is organized and managed by the Student Activities Committee under the Member and Geographic Activities business unit of IEEE.

### Eligibility

Participants must compete as part of a team. Teams are comprised of **up to 3** IEEE student or graduate student members, but can only include a maximum of 2 graduate student members per team. All team members must be IEEE student or graduate student members to register and compete in the competition. IEEE Membership numbers are required during the registration

process. All team members must be over the age of 18. Universities and Colleges can have multiple teams.

Each team must have a proctor who will supervise during the 24-hour programming competition and each team is responsible for locating one or more eligible Proctors (see below) prior to registration.

In order to rank in the competition all teams must have a proctor in *confirmed* status. All proctors receive an email upon teams registering. The proctor then has the option to confirm or decline the request to proctor that team. Should the proctor ignore the email, the status of the proctor remains in *unconfirmed* status. At the time of the competition, all teams whose proctor remains in *unconfirmed* or *declined* status, while able to participate, will not be eligible for prizes or participation certificates. Additionally, their ranking in the competition will not be included in the final rankings. It is the team administrator's responsibility to verify the proctor's status prior to the competition.

Team members must solve and complete the problems without assistance from other people or prewritten code. Please note that the intent and spirit of the competition is for the students, not others, to solve a problem. Persons acting as Proctors must limit the level of support and must not contribute in any other form that might be considered original authorship, or in any way that may enable claims of rights or ownership to the submitted entries. In no case will work-on-behalf of teams or individuals be allowed. Sponsor reserves the right to analyze all submissions for plagiarism and disqualify or deduct points from any team in its sole discretion if the team's work is not its own.

Void where prohibited by Law. Entrants understand that Sponsor may substitute or withhold prizes as required by law.

## Registration

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Registration will be open from August 6, 2018 until October 12, 2018 (00:00:00 UTC). Registrations received before or after this period are void. Sponsor's computer is the official time-keeping device for the contest. Teams can find registration information at <http://www.ieeextreme.org>

## Proctors

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Each team must have a proctor to supervise competition activities.

Proctors must be an IEEE Member of higher membership grade. Student or Graduate Student Members are not allowed to proctor, but are encouraged to participate as a team member in the competition.

Proctor information (IEEE Member Number) is required during the registration process.

Student Branch Counselors or Department Chairs make great Proctors as they are all higher grade IEEE members. Many IEEE Young Professionals are also higher grade IEEE members and may be eligible to serve as proctors.

Teams may want to recruit two or more proctors so that one can take a break to rest during the 24 hour competition.

Proctor tasks include:

- Monitor the general flow of the activity
- Inform students when the competition begins, at the middle of it, when there are 6 hours left and when there is 1 hour left
- Ensure that no one external to the team members helps or assists the student participants in resolving the problems in any way
- Responsible for the receipt and distribution of prizes for student teams

If you need assistance in finding a proctor, please refer to IEEE [Collabratec](#) to search for higher grade members in your area.

Please note: A Proctor can support up to 8 student teams and all of the competition participants under an individual Proctor's supervision must compete in the same venue. For more information on venue, see the following section.

## Venue

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As IEEEExtreme is a virtual online competition, a physical location, or venue, must be identified for each team to use during the 24-hour competition.

Venues can be in an IEEE Student Branch office or a college lab or another location on campus. It must be a place that participants can use for the entire 24 hours during the competition and should be equipped with at least one computer and some type of connection to the internet. Each team must have at least one Proctor physically located within the venue at all times throughout the 24-hour competition.

## Student Branch Activity

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Student Branches, if able, should support and help to the participating teams, helping locate an appropriate venue for use during the competition, promoting the competition, assisting in identifying appropriate proctors, and increasing awareness of the student branch presence on campus.

Students attending universities who do not have an IEEE student branch on campus can still participate in the IEEEExtreme competition. This is an opportunity to bring students together to have fun with IEEE activities. Consider using this opportunity as a way to form a student branch. More information on how to form a student branch can be found [here](#).

[[http://www.ieee.org/societies\\_communities/geo\\_activities/forms\\_petitions/forms\\_petitions\\_index.html](http://www.ieee.org/societies_communities/geo_activities/forms_petitions/forms_petitions_index.html)]

## Problems

Problems are developed and judged by expert programmers. All entrants agree and acknowledge that Sponsor is the owner of all problems and any associated code. Entrants further agree that they will not use the problems or any associated code for any reason other than the competition without written permission from Sponsor. The panel of judges is made up of higher grade IEEE members from both Academia and Industry backgrounds.

Problems will be categorized as easy, moderate, difficult, advanced, and Xtreme to allow for students of all experience levels to participate.

All of the problems can be answered in any of the supported languages, which are indicated in the table below. The time and memory limits are unique to every problem, and it is possible that certain programming language have a different time limit and memory limit, to adjust for factors such as virtual machine overhead.

Language	Version	Language environment
C	gcc 6.3.0, C99 standard	Math library -lm
C++	g++ 6.3.0, C++14 standard	Math library -lm
Java 8	Open JDK 1.8.0_131	Name your class Main for your program to work
Python 2	Python 2.7.13	numpy and scipy libraries are available
Python 3	Python 3.6.1	numpy and scipy libraries are available
Haskell	GHC 8.0.2	
C#	Mono C# compiler 4.6.2	Compiled with <code>mcs -define:ONLINE_JUDGE -define:CS_ACADEMY</code>
PHP	PHP 7.0.18	
Perl	Perl 5.24.1	
Ruby	Ruby 2.3.3	
Objective-C	gcc 6.3.0	Runtime(gnustep-libobjc2) Foundation Kit Blocks runtime libdispatch
Swift	Swift 3.1.1	Foundation
Common Lisp (SBCL)	SBCL 1.3.3	
Lua	Lua 5.2.4	
Erlang	Erlang/OTP 19 [erts-8.2.1]	Have your main function in module solution
Javascript	Node v7.10.0	
Go	Go 1.7.4 linux/amd64	
OCaml	OCaml 4.02.3	
Smalltalk	GNU Smalltalk 3.2.5	

Tcl	TCL Shell 8.6.6	
Pascal	Free Pascal 3.0.2	Compiled with <code>fpc -O2 -Sgic -viwn -Tlinux -dONLINE JUDGE -dCS ACADEMY -XS</code>
BASH	Version 4.4.7	
Fortran	GNU Fortran 6.3.0	Compiled with <code>gfortran -ffree-form</code>
COBOL	OpenCOBOL 1.1.0	Compiled with <code>cobc -free -x</code>
Ada	GNATMAKE 6.3.0	
Octave	GNU Octave 4.0.3	
Scala	Scala 2.11.8	Runned with <code>scala -J-Xmx4g -J-Xss256m -DONLINE JUDGE -DCS ACADEMY Main</code>

A demo practice contest community, with sample problems from IEEEExtreme 10.0 & 11.0, can be found at: <https://csacademy.com/ieeextreme-practice/>.

## Problem Submission

Teams should submit their problem solutions electronically using the contest management tool. Instructions on access and utilization of the contest management tool will be provided to teams after registration closes.

The 2018 contest problems will be available the day of the contest.

## Scoring Criteria

30 points are awarded for correct answers. 70 extra points can be awarded depending on problem difficulty. The difficulty of any problem comes from the average points teams scored on it; should many teams solve the same problem, that problem is determined to be easy and no additional points will be awarded. However, few teams solve a problem the problem will be deemed hard and will be credited with additional points. This scoring schematic makes the competition and your placement within the ranking very dynamic. It is strongly advised you not to share your solution with other teams, as it will harm your score.

Note: Time is not directly included in the scoring formula. Its purpose is to break ties, so teams that solve the same set of problems, only quicker end up higher in the standings. Since there is no penalty for the number of times a team submits a solution, it is recommended teams try to solve the tasks as quickly as possible.

The exact formula for calculating the points value of a problem:

$$Problem\ Score = 30 + 70 * (1 - Average\ Points)^2$$

Where

$$\textit{Average Points} = \frac{\textit{Total points for all test cases obtained over all teams}}{\textit{Total points of all test cases} \times \textit{Number of teams}}$$

Average Points can be a number between 0 and 1, where 0 represents tasks that no one solved, and 1 represents tasks that all users solved.

### **Partial scoring:**

Problems contain more than one test case. Those included in the sample will carry less weight whereas hidden cases will carry more weight on a varying degree depending on difficulty.

The higher number of solved cases a team submits, the higher the score will be. Therefore, should a team solve 3 out of 5 possible cases, while another team solved 5 out of 5, the team solving 3 would receive partial credit for that problem.

$$\textit{Submission Score} = \textit{problem score} * \frac{\textit{Sum of correct test cases' weights}}{\textit{Sum of all test cases' weights}}$$

Rank is decided upon score. However, terms of draw time will be considered as a factor to rank teams. Ex: Team A and Team B can have same score, let's say X, but then have different ranks, say Rank 2 and Rank 3. This means the Team with higher rank was faster to solve problems compared to the other team.

## Tie Breakers:

Time is of the essence. Submission time will be utilized to determine tie breakers.

Submission Number	Problem Number	Submission Time	$\frac{\text{Sum of correct test cases' weights}}{\text{Sum of all test cases' weights}}$
1	1	1 am, UTC	0.20
2	2	2 am, UTC	0.90
3	1	3 am, UTC	0.70
4	1	4 am, UTC	0.70
5	1	5 am, UTC	0.60

To calculate the total submission time for the example, we consider the best submissions for each problem. For problem 2, the best (and only) submission occurred 2 hours into the contest. For problem 1, the best submission occurred 3 hours into the contest. Note that if an identically scoring submission occurred later, we use the earliest of these identical submissions. Therefore, we ignore submission number 4 and 5 because neither of these were an improvement over submission number 3. In this case, then, the total submission time for the team would be 5 hours.

**Submission time for each problem is calculated at the beginning at the release of each challenge, not at the start of the competition.**

## Reminders:

No programming language has an advantage over the others. (Ex: Java, C, Python, PHP, etc. are all equal).

Scores will be impacted only by submissions, compiling will not affect scores.

Due to the dynamic nature of the scoring schematic, scores may fluctuate throughout the competition. Teams are encouraged to check in often to review their standings.

## Supported Browsers

The browsers that are supported to run IEEEExtreme 12.0 are as follows:

- Chrome v 58
- Firefox v 51
- Edge v 14
- Safari v 10

Please consult each browser's Web site for more information on updates.

## Plagiarism Policy:

IEEEExtreme retains the right to review the contestants' submissions with tools and techniques to detect acts of plagiarism. Sponsor reserves the right to disqualify any team that is identified (during or after the competition) for inappropriate collaboration, reuse of material, and/or failing to meet the requirements as indicated by the IEEEExtreme rules at Sponsor's sole discretion.

# Selection of Winners

Winners are determined strictly based on overall score as determined by the scoring outlined above. As noted above, in the case of a tie, time will be considered as a factor to rank teams.



## Notification of Winners and Final Rankings

From the close of the competition through on or about 15 November the IEEEExtreme Technical team will be evaluating code submissions. IEEE reserves the right to disqualify a team if it's found to have manipulated or cheated during the competition. The official results will be communicated on or about 15 November. Winners will be contacted by IEEE directly.

## Requirements of Winners

IEEE may, within its sole discretion, require each member of each prize winning team to sign and return an affidavit of eligibility and liability and publicity release, in which each winning member consents to the use of his or her name, age, hometown and photo by IEEE for advertising and promotional purposes, without any additional compensation, wherever lawful, as a precondition to award of a prize. If any prize winning team member fails to sign and return the requested affidavit of eligibility and liability/public release as requested by IEEE, that team member may be disqualified, and his or her prize will be forfeited. In the event an entire team fails to sign and return the requested affidavit of eligibility and liability/public release as requested by IEEE, an alternate winner will be chosen using the methods described above. IEEE may also require each winner to assign all rights in any submission that is chosen as a winner to IEEE as a precondition to award of a prize. If any prize winner fails to assign all rights in the selected submission to IEEE, the winner may be disqualified, and his or her prize will thereafter be awarded to an alternate winner from the remaining valid entries using the criteria specified above. All prizes, including the travel arrangements for first place winners, must be claimed within one calendar year of the competition.

Teams affected by [OFAC policies](#) who are interested in competing in the contest may still be eligible to compete but understand that access to prizes may be modified or removed by law.

## Prizes

All active participants in the competition will receive a digital certificate and digital gift. "Active participant" is described as a team who makes a reasonable attempt at solving a problem in Sponsor's sole discretion.

### Prizes for IEEEExtreme 12.0

1st place: The winning team members will receive an expenses-paid trip to an IEEE conference of their choice, anywhere around the world. Round Trip coach airline tickets for each winner from winner's preferred major metropolitan airport to the conference destination, conference registration fees, and a three-night hotel stay in a standard room (confirmation pending) will be provided by IEEE for each winning team member. The maximum value of this prize is \$10,000 per team. All expenses not specified above including, but not limited to, baggage fees, ground transportation, meals, beverages, gratuities, incidentals, taxes and any costs in excess of the maximum value of this prize are the sole responsibility of each winning team member. Any unused portion of the prize is not transferable or exchangeable and cannot be redeemed as cash. All travel arrangements will be made by Sponsor, whose decisions regarding the itinerary are final.

2nd place: Each member of the team that wins 2nd place in the IEEEExtreme 12.0 competition will receive a Series 3 Apple Watch with GPS and Cellular. The estimated retail value of this prize is \$400.

3rd place: Each member of the team that wins 3rd place in the IEEEExtreme 12.0 competition will receive a Series 3 Apple Watch with GPS. The estimated retail value of this prize is \$330.

4<sup>th</sup>-10<sup>th</sup> place: Each member of the 4<sup>th</sup> through 10<sup>th</sup> place teams in the IEEEExtreme 12.0 competition will receive a waterproof Bluetooth Speaker. The estimated retail value of this prize is \$45.

"Top 100: All members of teams that place in the top 100 at the end of the competition will receive a special edition IEEEExtreme 12.0 gift bundle, including a reserved IEEEExtreme "Top Coder" t-shirt.

Taxes, if any, are the sole responsibility of each winning team member. Sponsor makes no warranties or disclaimers concerning the prizes beyond those customarily given by the manufacturer of the prizes. Sponsor reserves the right to substitute different prizes of approximately equivalent value in its sole discretion.

Void where prohibited by law.

## **Use of Entries**

No entries will be returned. All entries become the property of IEEE. By entering, all participants consent to the use by IEEE of all the information provided in the entries for marketing or sales promotion purposes without any attribution, identification, right of review or compensation. All entrants agree to release and hold harmless IEEE and its officers, directors, employees and agents from and against any claim or cause of action arising out of participation in the contest. By registering for this contest, entrants acknowledge and agree that any personal information that they provided will be maintained in accordance with Sponsor's Privacy Policy, which can be found at:

[http://www.ieee.org/security\\_privacy.html?WT.mc\\_id=hpf\\_privacy](http://www.ieee.org/security_privacy.html?WT.mc_id=hpf_privacy)

Entrants agree that any photographs submitted to Sponsor or posted by entrants on social media in connection with the competition may be used by IEEE for marketing or sales promotion purposes without any attribution, identification, right of review or compensation.

## **Disputes Concerning the Competition**

EACH ENTRANT AGREES THAT: (1) ANY AND ALL DISPUTES, CLAIMS, AND CAUSES OF ACTION ARISING OUT OF OR IN CONNECTION WITH THIS CONTEST, OR ANY PRIZES AWARDED, SHALL BE RESOLVED INDIVIDUALLY, WITHOUT RESORTING TO ANY FORM OF CLASS ACTION, PURSUANT TO ARBITRATION IN NEWARK, NEW JERSEY, CONDUCTED UNDER THE COMMERCIAL ARBITRATION RULES OF THE AMERICAN ARBITRATION ASSOCIATION THEN IN EFFECT, (2) ANY AND ALL CLAIMS, JUDGMENTS AND AWARDS SHALL BE LIMITED TO ACTUAL OUT-OF-POCKET COSTS INCURRED, INCLUDING COSTS ASSOCIATED WITH ENTERING THIS CONTEST, BUT IN NO EVENT ATTORNEYS' FEES; AND (3) UNDER NO CIRCUMSTANCES WILL ANY ENTRANT BE PERMITTED TO

OBTAIN AWARDS FOR, AND ENTRANT HEREBY WAIVES ALL RIGHTS TO CLAIM, PUNITIVE, INCIDENTAL, AND CONSEQUENTIAL DAMAGES, AND ANY OTHER DAMAGES, OTHER THAN FOR ACTUAL OUT-OF-POCKET EXPENSES, AND ANY AND ALL RIGHTS TO HAVE DAMAGES MULTIPLIED OR OTHERWISE INCREASED. ALL ISSUES AND QUESTIONS CONCERNING THE CONSTRUCTION, VALIDITY, INTERPRETATION AND ENFORCEABILITY OF THESE OFFICIAL RULES, OR THE RIGHTS AND OBLIGATIONS OF ENTRANT AND SPONSOR IN CONNECTION WITH THE CONTEST, SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW JERSEY, WITHOUT GIVING EFFECT TO ANY CHOICE OF LAW OR CONFLICT OF LAW, RULES OR PROVISIONS (WHETHER OF THE STATE OF NEW JERSEY OR ANY OTHER JURISDICTION) THAT WOULD CAUSE THE APPLICATION OF THE LAWS OF ANY JURISDICTION OTHER THAN THE STATE OF NEW JERSEY. SPONSOR IS NOT RESPONSIBLE FOR ANY TYPOGRAPHICAL OR OTHER ERROR IN THE PRINTING OF THE OFFER OR ADMINISTRATION OF THE CONTEST OR IN THE ANNOUNCEMENT OF THE PRIZES.

## **Funding Sources**

The IEEEExtreme 12.0 Competition is being underwritten by IEEE Membership and Geographic Activities Department.

Corporate Sponsorship opportunities are still available. Please contact [ieeextreme@ieee.org](mailto:ieeextreme@ieee.org) for more information.

## **Agreement to the Official Rules**

By participating in this contest, participants agree to abide by the terms and conditions as established by IEEE. IEEE reserves the right to qualify all submissions and to reject any submissions that do not meet the requirements for participation as established by IEEE.

Additional Terms and Conditions:

Sponsor assumes no responsibility for computer system, hardware, software or program malfunctions or other errors, failures, delayed computer transactions or network connections that are human or technical in nature, or for damaged, lost, late, illegible or misdirected entries or submissions; technical, hardware, software, electronic or telephone failures of any kind; lost or unavailable network connections; fraudulent, incomplete, garbled or delayed computer transmissions whether caused by Sponsor, the users, or by any of the equipment or programming associated with or utilized in this contest; or by any technical or human error that may occur in the processing of submissions or downloading, that may limit, delay or prevent an entrant's ability to participate in the contest.

Sponsor reserves the right, in its sole discretion, to cancel or suspend this contest and award prizes from the entries received up to the time of termination or suspension should virus, bugs or other causes beyond Sponsor's control, unauthorized human intervention, malfunction, computer problems, phone line or network hardware or software malfunction, which, in the sole opinion of Sponsor, corrupt, compromise or materially affect the administration, fairness, security or proper play of the contest or proper submission of entries. Sponsor is not liable for any loss, injury or

damage caused, whether directly or indirectly, in whole or in part, from downloading data or otherwise participating in this contest.

## **Contest Results and Official Rules**

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To obtain the names of the winners and/or a copy of these Official Rules, send a self-addressed, stamped envelope to IEEEExtreme 12.0 Competition, Member and Geographic Activities, IEEE, 445 Hoes Lane, Piscataway, New Jersey 08854.