

## A Contest fORged by Amazon Web Services and cORe

This contest is open to any student (or a team of at most 2 students) who is (are) enrolled in any graduate program anywhere in the world. However, in order to *win* this contest, you have to *present the results* (either in person or via Skype) at an event during the INFORMS conference in Seattle, October, 2019. The exact date and location of this event will be announced as the schedule becomes final. The goal of this contest is to encourage best practices in *data driven analytics*, especially as it relates to reproducibility of computational experiments. Towards this end, the University of Southern California (USC), with sponsorship from the National Science Foundation (NSF) has produced a cyberinfrastructure which will facilitate **computational OR exchange (cORe)**. The cORe project is a joint effort between USC's Data Driven Decisions Lab, and the Information Sciences Institute (ISI). This contest itself is being generously sponsored by **Amazon Web Services**, an established leader in several aspects central to INFORMS. Contestants are advised to adopt any scientific approach (*e.g., Artificial Intelligence, Constraint Programming, Inventory Theory, Metaheuristics, Machine Learning, Simulation Optimization, Statistics, Stochastic Programming*).

**Basic Information.** This contest focuses on an inventory problem for which open source demand data is available at <https://sites.google.com/usc.edu/gomez/data>. This data set provides *monthly demand for a hardware device* for the years 1996-2005. Contestants are allowed to use the data from Jan. 1996 to Dec. 2005 to gain insights; however, all insights gained from the data must be shared in the report. Next, one should think of the inventory system “going-live” on Jan. 1, 2006, and from then on, all insights are restricted to be *non-clairvoyant*. That is, insights are only possible after the demand for a date has been observed, and not before. *The test-period for validating the proposed methodology will be 24 months, starting in Jan. 2006, and continuing until December 2007. These tests will be carried out by a judging team*, and the finalists will be chosen based on the following criteria: a) performance of the methodology on the testing data, b) clarity with which the methodology is described in the report, and c) clarity of the instructions for using the model (plus code) for the purposes of testing with the data from Jan. 2006 – Dec. 2007. While the testing data is not provided, it is advisable for contestants to conduct their own validation tests.

**Further Data and Information.** The specific costs incurred for running the system are inventory holding costs at \$1 (per piece, per month), so long as the total inventory is less than 90. If the inventory for a month exceeds 90, then the additional units in inventory are charged an additional dollar of holding cost for that month (i.e. holding cost at \$2 per piece, per month). To keep the accounting during the month relatively simple, you may assume that the product sales (demand) happen at the start of the month, and the inventory holding cost is applied to the end-of-month inventory after sales are satisfied (to the extent possible). On the other hand, if an order is placed at the beginning of month  $t$ , then the stock is replenished only at the start of the next month ( $t + 1$ ). Finally, if some demand in a month is not satisfied, then, we incur a backorder cost of \$3 per piece. The goal of this contest is to allow students to use their creativity in analytics, computations, and optimization to design a model and a suitable algorithm which will be tested on two years of data immediately following the training period ending in 2005. Some additional information that is available is that the ending inventory for December 1995 was 60 pieces, and the ending inventory for December 2005 was 73 pieces.

**Submission Details.** The report has a page limit: 8 pages. It should include the mathematical description of your methodology, as well as a description of how to run your inventory planning system for a period of two years using an input format which is the same as the csv data file provided in the link given above. The program should produce the following outputs for each month: beginning inventory, order quantity, ending inventory, holding cost, and backorder cost. As a summary, the program should also output total cost, as well as, total and average holding costs, and total and average backorder costs. Finally, the report should include a “Read Me” section which outlines exactly what steps should be taken to run the program, including the need for certain software.

**Final Submission.** There is no entrance fee. The report and the program should be uploaded on github and the name of the repository should be e-mailed to [sen@datadrivendecisions.org](mailto:sen@datadrivendecisions.org). The subject of the e-mail should be “fORged by Machines”. The deadline is 11:59 pm (Pacific time) on October 12, 2019. The e-mail should provide the name of contestant(s), e-mail address(es) and their affiliation. Please attach a letter from a faculty member who should be an INFORMS member, and who should vouch for the student-status of the contestants.

**Judging the Contest and Awards.** A panel of experts will choose the top 3 submissions who will be designated as Finalists. The submissions will be judged according to the criteria mentioned in the paragraph called Basic Information. The final selection of a winner, runner-up and honorable mention will include the quality of the presentation. If you (or the team) are judged the winner of the contest, the award will include a check for \$1,000. If you're a runner up, you will win \$500, and as an honorable mention, you will win \$250. **You've got to go for it!**