

# The First Olympic Games of Logic

**The Vienna University of Technology is the first venue of the Olympic Games of Logic. Teams from all over the world have developed computer programs which will compete during the “Vienna Summer of Logic”.**

These Olympic Games are not about physical strength, but about speed, flexibility and intelligence. Computer programs developed by researchers from all over the world will compete in various logic challenges. The Olympic Games are part of the “Vienna Summer of Logic”, the largest scientific event in the history of logic. For computer science enthusiasts, there will be live screenings with public access at the Vienna University of Technology, and the award ceremonies will be held on July 17 and July 21.

## **Every Four Years**

“Citius, Maius, Potentius – Faster, Bigger, More Powerful” is the motto of the Olympic Games of Logic. “Competitions of computer programs developed by teams from different universities have already been held in the past”, says Thomas Krennwallner, the main organizer, “but now, on the occasion of the Vienna Summer of Logic, we have bundled existing competitions, creating one major event.”

The event establishes a new tradition. From now on, the “FLoC Olympic Games” (“FLoC” stands for “Federated Logic Conference”) will take place every four years, just like the Olympic sports games. The winners will take home medals with a picture of the great Viennese Logician Kurt Gödel.

In most competitions, human interference is not allowed. The computer code has already been developed, in most cases by teams of several people. The programs have to compete and solve as many logic problems as possible in a given period of time. In different disciplines, the programs are facing quite different kinds of tasks – such as finding logical errors in computer chips, automatically analysing computer code or generating mathematical proofs.

## **Watch, Learn, Cheer**

“Competitions which require especially long computing times have already started, many take place during the Vienna Summer of Logic from July 13 to July 21”, says Thomas Krennwallner. Just like the Football World Cup has its fan zones and public viewings, the Olympic Games of Logic can be watched on “Big Screens” at the Vienna University of Technology. There, fans of computer science can come together, take a look at the current standings, have experts explain the details and keep their fingers crossed for their favourite teams – or rather: favourite program codes. The winners will receive their medals in two award ceremonies on July 17 and 21 (4:30 pm to 7 pm).

“For us, the Olympic Games of Logic are much more than just an entertaining pastime”, says Thomas Krennwallner. “For our research, the connection between theory and practice is very important. In order to win the competitions, complex theoretical concepts have to be applied to very practical problems, as they arise in the computer industry every day.” In turn, practical problems yield important new ideas for theoretical research.

## **Logic and Olympics – a Logical Combination**

The Olympic Games are rooted in traditions from ancient Greece, much like modern day research in logic. Aristotle was one of the first philosophers working on logic; in the twentieth century logic became an important tool for fundamental mathematics. Today logic has become an indispensable part of computer science.

## The Competitions of the Olympic Games of Logic

The FLoC Olympic Games consist of 14 different competitions, which can be roughly divided into several “classical disciplines of logic”.

### **Hardware and Software Verification**

Can we be sure that some computer chip always gives us the correct results or that some computer program never crashes, regardless of the input data? Using methods from logic, computer codes can test hard- and software. This is particularly important for the chip industry, but also for applications in which an error might lead to catastrophic consequences – for instance the program codes of a space station.

### **Software Synthesis**

Why should the task of writing computer code not be carried out by computer code too? In this discipline, computer programmes have to generate code according to predefined specifications.

### **The Halting Problem**

Will a specific computer program ever finish a certain calculation, or will it be caught in an infinite loop? The computer pioneer Alan Turing showed that this question cannot be answered rigorously in all cases, but clever programs can do this kind of analysis and often find the correct result.

### **Automatic Theorem Proving**

Can a particular logical statement be derived from other logical statements? Today computer programmes can find logical proofs and determine whether a statement can be proved in a certain context.

### **Intelligent Data Management**

It is easy to generate a list of streets, addresses and shops in a city. But how can this data be searched so that intelligent search requests are possible – for instance looking for a park close to a cinema with a cocktail bar nearby? Complex data management requires the tools of modern logic.

### **Planning, Analyzing, Problem Solving**

Several competitions touch upon the field of artificial intelligence. This discipline is all about tasks which cannot be solved by simple numerical calculations or by brute force search for all possible solutions. For many hard problems, a computer program needs an intelligent strategy. Finding the shortest route connecting many stops in arbitrary order or scheduling planes and runways in a large airport are such difficult problems.