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## Invited Talk

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### **Title: "Solving a Reasoning Problem equals Playing a Game"**

*A formal reduction of Sudoku Puzzle into SAT*

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**Abstract:** Proving Boolean Satisfiability (SAT) is NP-complete [1] and is believed to be an intractable problem. Being a member of an NP-complete complexity class, SAT has gained an immense theoretical and practical significance. This is because any problem can be shown intractable and amazingly some of its instances efficiently solvable by simply providing its reduction to SAT. Now a days, state of the art SAT solvers are capable of solving large scale real world problems, containing millions of variables, in milliseconds. But at the same time, we also anticipate that the worst case complexity result still holds true. Thus, efficient SAT solvers provide a boost in solving search problems that are related to reasoning, model checking, searching by simply defining problem instance reduction to SAT. In this talk, I present an introduction about why SAT is important and present the example of a Sudoku Puzzles solver. The solver transformed the puzzles into SAT formulae and an off the shelf SAT solver find the solution efficiently. This technique can be adopted by a number of domains.

**Bibliography:** [1] Stephen A. Cook. The complexity of theorem-proving procedures. In Proceedings of the third annual ACM symposium on Theory of computing, STOC 71, pages 151-158, New York, NY, USA, 1971. ACM.