

# NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

## C S S E M I N A R

**Title:           Computing the Ramsey Number  $R(4,3,3)$  using Abstraction and Symmetry breaking**

Speaker:       Professor Michael Codish  
                  Department of Computer Science  
                  Ben-Gurion University

Date/Time:     29 February 2016, Monday, 10:30 AM to 12:00 PM

Venue:         MR1, COM1-03-19

Chaired by:   Dr Yap Hock Chuan, Roland, Associate Professor, School of Computing  
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### Abstract:

The number  $R(4,3,3)$  is often presented as the unknown Ramsey number with the best chances of being found "soon". Yet, its precise value has remained unknown for almost 50 years. This paper presents a methodology based on abstraction and symmetry breaking that applies to solve hard graph edge-coloring problems. The utility of this methodology is demonstrated by using it to compute the value  $R(4,3,3)=30$ . Along the way it is required to first compute the previously unknown set  $RR(3,3,3;13)$  consisting of 78,892 Ramsey colorings.

### Biodata:

Michael Codish completed his PhD in 1991 at the Weizmann Institute of Science in Israel. Since 1994 he is with the faculty of the Ben-Gurion University of the Negev in Israel.

Michael Codish is best known for his work applying abstract interpretation to the analysis of logic programs. Since the mid 90's he focussed on the analysis of termination of logic programs. He introduced a semantic definition for logic programs that makes termination an observable. Implementing that semantics as an interpreter and then abstracting the interpreter led to the termination analyzer called TerminWeb, which at the time (1995) was one of the first program analyzers that could be applied via a web interface.

In 2005 while visiting Melbourne University, Codish and colleagues, Lagoon and Stuckey, pioneered the application of SAT solving techniques to a termination analysis problem (for term rewrite systems). Since 2005 Codish has applied SAT solving to a variety of termination and other types of problems. This is one of his main current interests.

