

ESF Research Networking Programme
Games for Design and Verification



www.games.rwth-aachen.de

Programme Chair:

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Scope and objectives of this network

This network proposes a research and training programme for the design and verification of computing systems, using a methodological framework that is based on the interplay of finite and infinite **games**, mathematical **logic**, and **automata** theory.

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This network proposes a research and training programme for the design and verification of computing systems, using a methodological framework that is based on the interplay of finite and infinite **games**, mathematical **logic**, and **automata** theory.

We want to bring this methodology to maturity, and access new applications by providing more faithful and realistic models for interactive systems. To do so, we have to extend game-based design and verification methodologies to more challenging models of infinite games.

Background and motivation

Growing need for formal methods that guarantee reliability, correctness, and efficiency of interactive computing systems.

There are successful specification and verification methods, based on logic and automata.

Example: model checking for hardware verification

However, still essential **limitations** of these methods.

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However, still essential **limitations** of these methods.

- A.** Current verification methods often **not efficient enough** for realistic applications
- B.** no faithful representation of **complex interactive behaviour** of processes
- C.** most methods limited to systems with **finite state space**
- D.** no adequate **treatment of data** (emphasis on flow on control)

Games

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As an organizational principle, the concept of game offers a fresh and intuitive way of thinking through complex issues.

The mathematics of games

Games:

- provide powerful mathematical frameworks with well-developed theories in different branches of science
- provide versatile models of computation (capturing interaction)
- have a long history as a method of logic:
model checking games, model comparison games, game logics,
games in set theory
- are intimately connected to automata: game-theoretic problems can often be translated into algorithmic problems for automata

There is now ample evidence that by combining techniques based on automata and logic with the mathematical and algorithmic theory of infinite games, we obtain a much more versatile and powerful methodology for the design and verification of computing systems.

Current challenges

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To access new application areas and to provide more faithful and realistic models for interactive systems, we have to extend game-based design and verification methodologies to more challenging models of infinite games.

These include infinite games involving **more than two players**, games with objectives that are **not necessarily antagonistic**, games with **quantitative** objectives, and games with various degrees of **imperfect or incomplete information**.

Who are we, and what have we done so far

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[Creation of a scientific community](#)

At the last workshop of the GAMES RTN (Cambridge 2006), the participants decided to continue this networking activity, but to look for a more flexible funding scheme that would permit a larger, scientifically broader and more ambitious network.

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[2006: Submission for an ESF Research Networking Programme](#)

[2007: GAMES 2007 in Lausanne, with more than 100 participants](#)

The GAMES ESF Research Networking Programme

GAMES was launched as an ESF Programme in March 2008.

It includes at least 150 researchers in 11 European countries (one or two more are likely to join soon).

Main activity: Annual GAMES Workshops

GAMES 2008: Warsaw, 11 - 14 September 2008, 100 participants

GAMES 2009: Udine, 14 -17 September 2009.

GAMES 2010: Oxford.

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GAMES Workshops are open and informal (without proceedings), scientifically broad, with a strong training component.

- Invited Tutorials (also on neighbouring fields)
- Contributed talks
- Short talks (mostly by students on their ongoing work)

Announcement: GAMES Spring School 2009

A GAMES Spring School will take place from 31st May – 6th June, 2009 in Bertinoro (near Bologna, Italy).

Lecturers: Krzysztof Apt, Erich Grädel, Marcin Jurdziński, Joe Halpern, Christof Löding, Stephan Kreutzer, Antonin Kucera, Jean-Francois Raskin, Dov Samet

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Further Activities:

- Small conferences on specific topics
- Short Visit Grants
- Exchange Grants

Budget: 120'000 Euro per year, for five years.

LogICCC and GAMES

Clear potential for cooperation, especially with the projects LINT (Logic for Interaction) and GASICS (Games for Analysis and Synthesis of Interactive Computational Systems), and probably others as well.

Common challenges:

- Understand imperfect information
- Acquiring knowledge through interaction
- ...