

# RELEASE

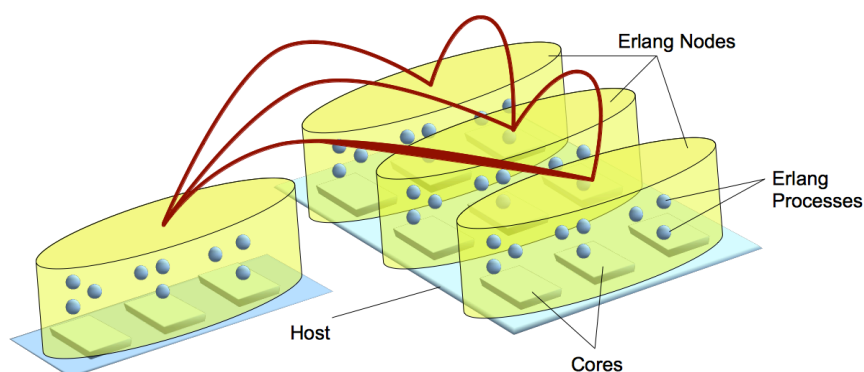


## Key Innovation

Every eighteen months during the last thirty years has seen the power of the computer that can be built on a silicon chip double – this has now come to a halt. Instead, chip manufacturers build multiple computers – or cores – on each chip: nearly all PCs are now ‘dual’ or ‘quad’ core, and the number of cores it is possible to put on each chip is growing exponentially.

Building software for these multicore systems requires radically new software development technologies that can exploit the different platform. Instead of programming a single core, the cores have to be programmed to work together in a coordinated way, and in a way that scales with the numbers of cores. Many expect 100,000-core platforms to become commonplace, and the best predictions are that core failures on such an architecture will be common, perhaps one an hour. Hence we require a programming model that is not only highly scalable but also reliable.

The project will deliver a scalable and reliable programming platform for multicore, using systems of communicating processes and embodied in the Erlang programming language, that will support the massively parallel machines of the next decade.



## Technical Approach

Our platform builds on the Erlang language and Open Telecom Platform (OTP) libraries that have concurrency and robustness designed in. Currently Erlang/OTP has inherently scalable computation and reliability models, but in practice scalability is

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287510

### Project coordinator

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### Project website

[www.release-project.eu](http://www.release-project.eu)

### Community contribution to the project

2,400,000 Euro

### Project start date

01.10.2011

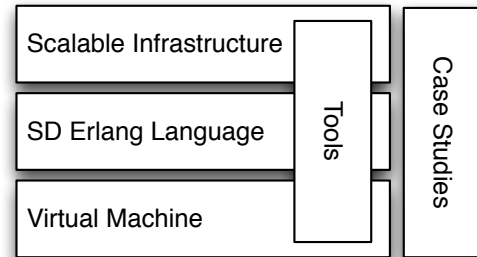
### Duration

**36 months**

constrained by aspects of the language and virtual machine. Moreover existing profiling and debugging tools don't scale.

The RELEASE consortium will attack these problems at three levels:

- We will evolve the Erlang virtual machine – which implements Erlang on each core – so that it can work effectively in large-scale multicore systems.
- We will also evolve the language to Scalable Distributed (SD) Erlang, and adapt the OTP framework to provide constructs to control how computations are spread across multicore platforms, and coordination patterns to allow SD Erlang to effectively describe computations on large platforms, while preserving performance portability.
- On top of the language and the virtual machine we will develop a scalable Erlang infrastructure to integrate multiple, heterogeneous clusters.



In order to make the best use of this platform, programmers need to be able to understand how their programs are behaving in practice. We will build tools to enable programmers to profile and visualize their SD Erlang applications, and to refactor Erlang programs to run scalably and efficiently under SD Erlang; finally we'll also support debugging SD Erlang systems when things go wrong

## Demonstration and Use

We will demonstrate the effectiveness of the RELEASE approach in two case studies.

EDF will port the Sim-Diasca simulation framework to the SD Erlang running on the Blue Gene parallel computing platform.

Erlang Solutions will build a scalable continuous integration service using SD Erlang. Beginning with a homogeneous platform, the system will be extended to work across heterogeneous cloud environments, employing both private clouds and clouds such as the Amazon ec2, and, finally, incorporating a capability-based management model. Each iteration of the development will be demonstrated in a representative real-world scenario.

Project partners	Country
<a href="#">Heriot-Watt University</a>	UK
<a href="#">University of Kent</a>	UK
<a href="#">Erlang Solutions Ltd</a>	UK
<a href="#">Ericsson AB</a>	Sweden
<a href="#">Institute of Communication and Computer Systems</a>	Greece
<a href="#">Electricité de France SA</a>	France
<a href="#">Uppsala Universitet</a>	Sweden

## Scientific, Economic and Societal Impact

Erlang is a beacon language for distributed computing, influencing not only the development of other programming languages and but also actor libraries and frameworks. Through the scientific developments of RELEASE we expect the project to have a strong and enduring impact on computing practice in the two decades. Only through a technology like SD Erlang can the full economic potential of multicore systems be realised.

### Key Features

- [Systems scalable to 100,000 cores per chip.](#)
- [Systems reliable in the face of core failure.](#)
- [State-of-the art tools give control of performance on multicore hardware.](#)
- [Case studies of highly concurrent simulation on the Blue Gene platform and a heterogeneous cloud-based continuous integration framework illustrate SD Erlang in practice.](#)