



**Project Title:** "EU-India Fostering COOPERation in Computing Systems"

**Project Coordinator:**  
Sotiris Ioannidis  
FORTH-ICS, Greece  
[sotiris@ics.forth.gr](mailto:sotiris@ics.forth.gr)

**Partners**  
FORTH  
KYOS  
TOG  
ITSMA  
CDAC  
IISc

**Project Website:**  
<http://www.euincoop.in>

**Project Start Date:**  
1<sup>st</sup> OCT 2011

**Project Duration:**  
24 months



**About EUINCOOP**

EUINCOOP is Coordination and Support Action (CSA) project which is running for 24 months from 1 October 2011 to 30 September 2013 funded by European Commission under FP7.

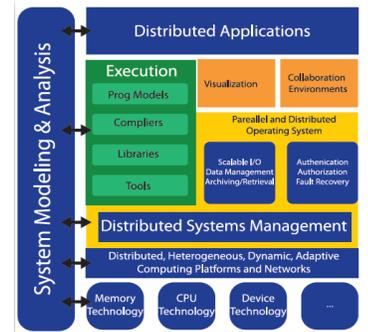
The EUINCOOP project objective is to stimulate cooperation in computing technologies between Europe and India, in order to support Europe's leading position in computing system, while ensuring mutual benefits for both Europe and India.

The partners of EUINCOOP cover a broad spectrum of competencies: Academic, research, small business, consulting and industry. These competencies are strengthened by our advisory committee forum created within span of the project.

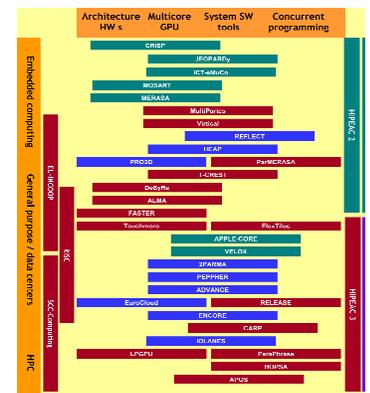
The advisory Committee will concretize the research priority areas, the gaps and overlaps between the two regions and also will guide the technical, policy and kind of funding mechanisms for future collaborative projects.

The project results will be a research roadmap that will promote useful information in terms of planned activities in both regions that can assist in the formation of research policy in computing systems in Europe and India

**Computing System Challenges**



**Overview of FP7 Research on Computing Systems**



**EU And India Research Priorities**

**India's Motivation** India has a proud heritage in building the indigenous series of super computers PARAM 80000. The start of supercomputing in India took off three decades ago. To regain its lost position in supercomputing India plans to invest 1 billion US dollars in supercomputing during the 12th plan period. Creation of HPC infrastructures, e-infrastructures, building exascale supercomputers, are high on the priority list of India. HPC in bioinformatics is the next big disruptive research topic India is looking at actively with the establishment Centers of excellence in supercomputing for bio informatics.

India has been collaborating with EU in many Computing systems projects in the last decade. EU- India grid, Belief- I and Belief- II, are good examples of its sustained cooperation. This strong background forms a basis for India's interest to collaborate with Europe. India's considerable expertise spans across universities, research institutes, and industrial companies.

**Europe's Motivation-** To be globally competitive in the arena of supercomputing, Europe wants to double its investment in high performance computing and deploy exascale machines before the end of the decade. The plan would increase Europe's public HPC spend from €630 million to €1.2 billion and pump a greater share of the money into development, training, and creating "new centers of excellence." Cloud computing is the next big thing happening in both India and Europe.

With many common grounds meeting India and Europe have a tremendous scope, potential, need and capability to collaborate in many areas of computing systems Position over past few years

**Technology Areas for Cooperation**

- Multicore
- Virtualisation
- Parallelisation
- Platform and Hardware
- Performance Analysis
- Predictability
- Reconfigurability
- Composability

## Comparing EU and Indian Priorities

EU operates through specialized task forces to create computing infrastructure and enable the evolution of the present computing systems where as India is realizing the need for organized and influential networks to further the interests of the computing systems community through special interest groups

Public private partnership and consortia led technology platforms are steering and leading the research in computing systems in Europe. Indian Research is independently happening at academic institutions and market driven research at industry level. PPP models are at a nascent stage. This offers a scope and opportunity to enforce PPP models through EU - India cooperation

In India Multi core architecture research is happening mainly in premier institutes like IIT Chennai and big MNC' like Intel and IBM, where as Multi core architecture research, reconfigurable computing, interconnects research is mainly undertaken by the cluster model 'task force' at HIPEAC where the impact level aimed could be high in Europe.

Task force in reconfigurable computing making advances in terms of capacity building, creating knowledge base that would eventually pave way for creation of opportunities and jobs in Europe

Reconfigurable computing is in its beginning stages with small incubating companies like morphing machines founded at IISc India is coming up with market ready applications.

Several EU and Indian research projects were evaluated and observations were made as follows

The EU has a greater number of projects addressing research into multicore technologies than India. This is likely related to the emphasis placed in India on applying advanced technologies like multicore, while the EU is investing in the design and development of advanced multicore platforms.

Both the EU and India have similar levels of interest in the use of virtualisation technologies.

Both the EU and India have similar levels of interest in technologies for improving parallelisation of systems. India has a few more projects, though some of these are more about applying advanced parallelisation techniques for specific application domains rather than researching new parallelisation techniques.

The EU has a greater number of projects addressing the platform and lower level system technologies than India. The motivation behind this is likely to be the same as the EU's greater emphasis on multicore research.

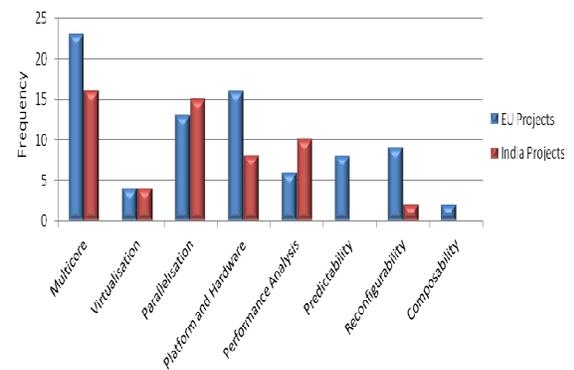
India has a larger number of projects that are focused on performance analysis and optimisation, though as in the case with parallelisation some of these are more about applying performance analysis techniques to address specific application domains needs rather than developing new techniques.

Reconfigurability plays a larger role in EU funded projects than in India research. The area for India projects where research into reconfigurability is most prevalent are related to Ubiquitous Computing.

These observations made early in the work programme of the EU-INCOOP project will be further investigated and areas for future collaboration will be identified as the EU-INCOOP project progresses.

## EU And India Cooperation Opportunities

Computing Systems Research Topics in EU and India Projects



## Research Collaboration- EU Vs India

Project Name	EU Project	India Project
Project 1	Yes	No
Project 2	No	Yes
Project 3	Yes	Yes
Project 4	No	No
Project 5	Yes	Yes
Project 6	No	Yes
Project 7	Yes	No
Project 8	No	Yes
Project 9	Yes	Yes
Project 10	No	No
Project 11	Yes	Yes
Project 12	No	Yes
Project 13	Yes	No
Project 14	No	Yes
Project 15	Yes	Yes
Project 16	No	No
Project 17	Yes	Yes
Project 18	No	Yes
Project 19	Yes	No
Project 20	No	Yes
Project 21	Yes	Yes
Project 22	No	No
Project 23	Yes	Yes
Project 24	No	Yes
Project 25	Yes	No
Project 26	No	Yes
Project 27	Yes	Yes
Project 28	No	No
Project 29	Yes	Yes
Project 30	No	Yes
Project 31	Yes	No
Project 32	No	Yes
Project 33	Yes	Yes
Project 34	No	No
Project 35	Yes	Yes
Project 36	No	Yes
Project 37	Yes	No
Project 38	No	Yes
Project 39	Yes	Yes
Project 40	No	No
Project 41	Yes	Yes
Project 42	No	Yes
Project 43	Yes	No
Project 44	No	Yes
Project 45	Yes	Yes
Project 46	No	No
Project 47	Yes	Yes
Project 48	No	Yes
Project 49	Yes	No
Project 50	No	Yes
Project 51	Yes	Yes
Project 52	No	No
Project 53	Yes	Yes
Project 54	No	Yes
Project 55	Yes	No
Project 56	No	Yes
Project 57	Yes	Yes
Project 58	No	No
Project 59	Yes	Yes
Project 60	No	Yes
Project 61	Yes	No
Project 62	No	Yes
Project 63	Yes	Yes
Project 64	No	No
Project 65	Yes	Yes
Project 66	No	Yes
Project 67	Yes	No
Project 68	No	Yes
Project 69	Yes	Yes
Project 70	No	No
Project 71	Yes	Yes
Project 72	No	Yes
Project 73	Yes	No
Project 74	No	Yes
Project 75	Yes	Yes
Project 76	No	No
Project 77	Yes	Yes
Project 78	No	Yes
Project 79	Yes	No
Project 80	No	Yes
Project 81	Yes	Yes
Project 82	No	No
Project 83	Yes	Yes
Project 84	No	Yes
Project 85	Yes	No
Project 86	No	Yes
Project 87	Yes	Yes
Project 88	No	No
Project 89	Yes	Yes
Project 90	No	Yes
Project 91	Yes	No
Project 92	No	Yes
Project 93	Yes	Yes
Project 94	No	No
Project 95	Yes	Yes
Project 96	No	Yes
Project 97	Yes	No
Project 98	No	Yes
Project 99	Yes	Yes
Project 100	No	No

For More Information:

<http://www.euincoop.in/>