OpenFPGA: Mission and Activities

Thomas Steinke, Eric Stahlberg

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Contact info: steinke@zib.de
OpenFPGA Vision

- Create a future where advances in reconfigurable computing technology will be easily and eagerly adopted, incorporated across critical high-performance computing and enterprise applications.

- OpenFPGA will be a catalyst for innovation and a vehicle for establishing standards for portability, performance and interoperability in the heterogeneous supercomputing community.

- OpenFPGA will advance contexts for reconfigurable computing research and channels for moving innovations into production use.
The Mission of OpenFPGA is ...

to promote the use of Field Programmable Gate Arrays
in high level and enterprise applications
by collaboratively defining, developing and
sharing critical information, technologies and best practices.

The mission is realized through pursuit of the following objective areas

- **Innovation and Evaluation** – sharing tools and best practices
- **Standardization** – collectively defining common implementations
- **Education** – developing skilled professionals
- **Promotion** – advancing successful application uses of FPGAs
- **Communication and Collaboration** – fostering communication
- **Participation** – expanding involvement

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OpenFPGA Quick History

Nov 2004  Initial planning following successful FPGA workshop by OSC
Feb 2005  Officially commenced with formation of cross-interest steering group
Feb 2005  Announced at Manchester Reconfigurable Computing workshop
Jul 2005   Co-host for RSSI held at NCSA
Sep 2005  First open standards working group discussion @ MAPLD
Oct 2005  Working groups formed
Nov 2005  BoF session at SC2005

Mar 2006  Draft organizational bylaws
May 2006  Organization formed to ease sponsorship of activities
Jul  2006  Working groups discussions at RSSI
Nov 2006  AMD cornerstone sponsorship / SC06 Booth and BoF

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Why Did OpenFPGA Emerge?

- **To Solve Fragmentation**
  - Many efforts working in isolation without cross-communication

- **To Address Common Challenges and Needs**
  - Expensive tools and long development times
  - No portability across vendors and across product versions
  - A Challenging market to enter

- **To Improve Common Practices**
  - Current situation similar to early days of message-passing and SMP
  - Vendor specific but common functionality
  - Technology emerging into general applications market

- **To Influence Priorities for Future Architectures**
  - Hardware interface designs and standards
  - Inter-component and inter-system designs and standards

- **To Lower the Risk of Adoption so Market Can Expand More Quickly**
OpenFPGA Steering Group

Cray, Inc.
George Washington University
GE Global Research
Koan Corporation
Mitrionics, Inc.
Nallatech, Inc.
NCI-ABCC
NCSA
NIST
Oak Ridge National Lab
OSC

Riken
Sandia National Lab
SGI, Inc.
SRC Computers, Inc.
Starbridge Systems, Inc.
University of Cincinnati
University of Manchester
University of South Carolina
University of Toledo
Zuse Institute Berlin

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OpenFPGA: Participants – World Wide

Now nearly 500 participants in over 40 countries worldwide

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OpenFPGA Company Profiles

OpenFPGA Company Areas
(top 270 participant areas)

- Research and Development
- Education/Training
- Manufacturing: Computer related (hw/sw/etc.)
- Engineering
- Government: Federal (including Military)
- Aerospace
- Computer/Network Consultant
- Media/Marketing/Advertising/Publishing

Additional Key Areas

- Financial: Commercial Banking
- Financial: Brokerage
- Energy
- Agriculture
- Pharmaceutical
- Local/State Government
- Retail / Wholesale

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Member Interest Areas

- Xilinx, Altera
- Wireless Communications
- Supercomputing
- Software tools
- Signal Processing and cryptography
- SoC
- Algorithms and Applications
- Benchmarks
- Numerical simulation
- Low-power design
- Data Mining
- Cellular Automata
- Biological modeling
- Bioinformatics
- Automotive
- Clusters of FPGAs

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OpenFPGA: What We Do

- **Promotion** – market building
  - Website, success stories, benchmarks

- **Participation** – community building
  - Nearly 500 participants worldwide
  - Over 40 countries

- **Communication & Collaboration** – sharing of ideas
  - Email lists, Wiki, RC application/development examples

- **Education** – expertise building
  - A starting point to bootstrap individual FPGA application development

- **Innovation & Evaluation** - assessments and new developments
  - Working groups and collaborations

- **Standardization** – common practices for portability and supportability
  - Rapidly developing

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OpenFPGA Organization

Worldwide Community Efforts and Membership
(Academic, Industry, Government)

- Working Groups
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- Board of Directors
- Biweekly Technology Round Table
- Standards Review Board
- Industry Advisory Council

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OpenFPGA: Taking Research to Practice

Academic Research

Research context and support

Technology innovations

OpenFPGA Community

Preproduction prototypes

Emerging challenges

Production Utilization

Standards and Validation

Support and Direction

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OpenFPGA Working Groups

- Comprised of OpenFPGA members
- Cross-disciplinary teams leveraging worldwide interest and investment in FPGAs

Activities supported through OpenFPGA
- Working group email lists
- Wiki for collaboration
- Technology roundtable for ongoing updates
- Financial support for working group activities
OpenFPGA Application Working Groups

- **Applications Requirements (U-APPREQ)**
  - Organizing lead: Eric Stahlberg (OSC)
  - Goal: Characterize application needs present and future

- **Benchmarking (T-BENCH)**
  - Organizing lead: Dean McCoullough (NCI-ABCC)
  - Goal: Provide performance metrics for comparison

- **Applications Libraries (T-APPLIB)**
  - Organizing lead: Thomas Steinke (ZIB)
  - Goal: Delivery of usable FPGA-enhanced application libraries
OpenFPGA Technology Working Groups

- **High-level Languages (T-HLLANG)**
  - Organizing lead: Ron Sass (U of North Carolina Charlotte)
  - Goal: Address efficient algorithm specification for FPGAs

- **General API (T-GENLIB)**
  - Organizing lead: Stefan Möhl (Mitrionics)
  - Goal: Define portable generalized FPGA API

- **Core Interoperability (T-CORELIB)**
  - Organizing lead: Dan Poznanovic (SRC)
  - Goal: Define interoperability among RC cores

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2007: Progress in Standardization

- **Core libraries**
  - Define interfaces for interoperability

- **General APIs**
  - Common interface supported across vendors

- **Application specific libraries**
  - First library API for molecular dynamics

- **Capability and performance benchmarks**
  - Adding new algorithmic benchmarks
2007 Standardization Activities

- Standards Definition

- Comment and Evaluation Period

- Standards Adoption
  - Reconfigurable Computing Summer Institute, NCSA, July 2007

- Standards Demonstration and Release
  - Supercomputing 2007 (November, Reno, Nevada)
OpenFPGA Member Network

- Nearly 500 participants via email
- Connecting through informal email discussions
- List members only traffic – no spam
- Simple sign-up at the OpenFPGA site
Join in the Future of OpenFPGA

- Low-cost individual membership makes OpenFPGA open to all
- Funding directed to working group activities
- Easy sign up at the OpenFPGA site
- Sponsorship opportunities exist for companies and organizations

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Acknowledgements

- OpenFPGA Steering and Organizing Committee

- Early Supporters
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- First Cornerstone Sponsor
  - AMD