OPENFABRICS ALLIANCE

Overview of the OpenFabrics Alliance and OpenFabrics Enterprise Distribution (OFED™)

Open Source, High Performance and High Efficiency Software for Data Center Fabrics

For more information: admin@openfabrics.org

OFA Members and End Users

- Worldwide community; participants are top tier
  - Chip, System, Storage, Software, ISV, OSV Integrators, Resellers
  - Enterprise, Government, Academic, Service Providers
- Development, distribution, certification and promotion
- Open-source software for unified computing and fabrics
- Server and storage connectivity
- Apps: high performance, low latency, virtualized, high efficiency

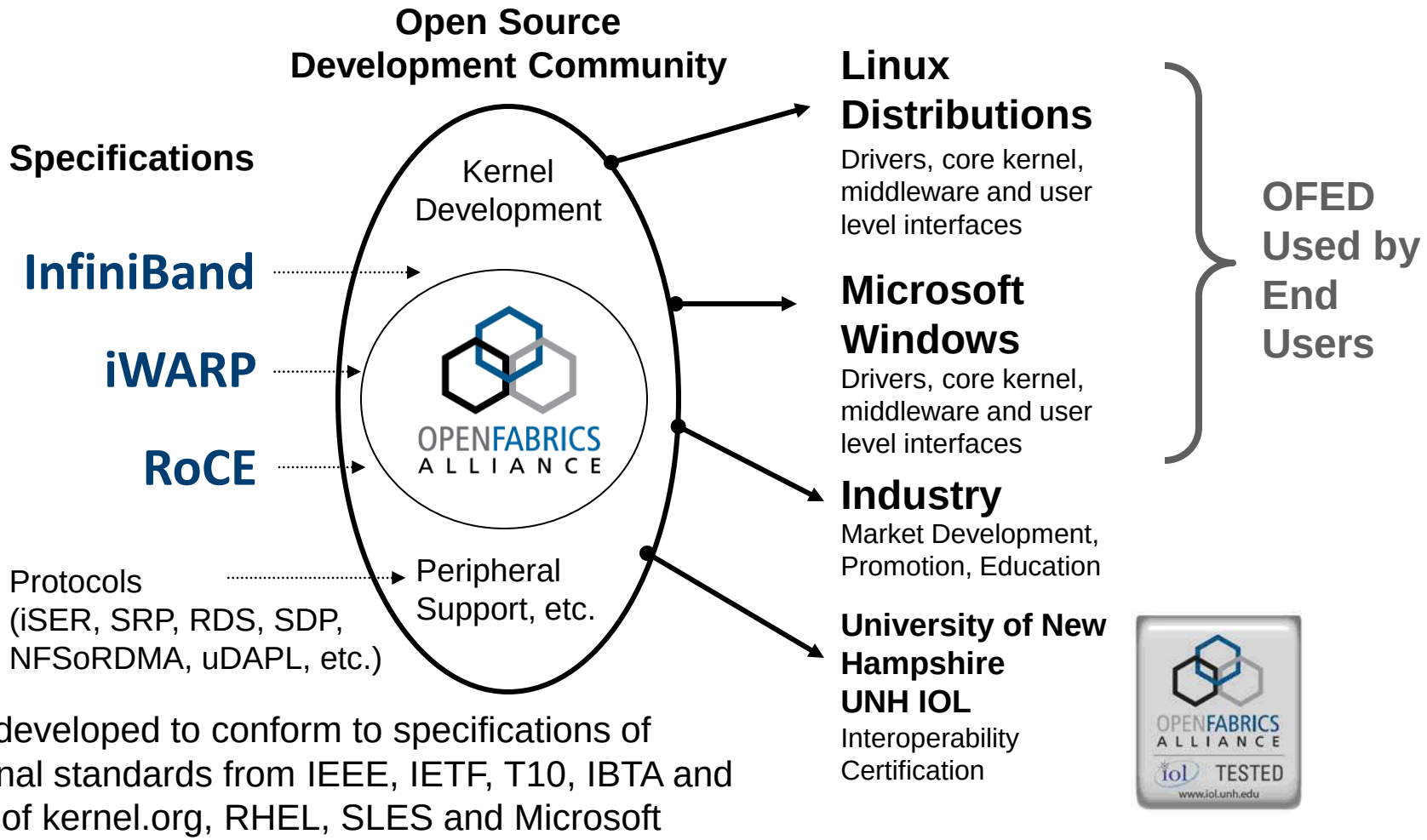
OFA Purposes and Activities

- Develop and distribute OpenFabrics Enterprise Distribution (OFED™)
  - Open-source, RDMA-enabled, transport-independent software stacks for Linux and Windows operating systems
- Deliver protocols for high-bandwidth, low-latency, efficient computing
- Promote benefits of software to data center, cloud and HPC apps
- Certification for software with vendor products
- Software ecosystem development: major OS, software, system suppliers

Product Provenance Mark

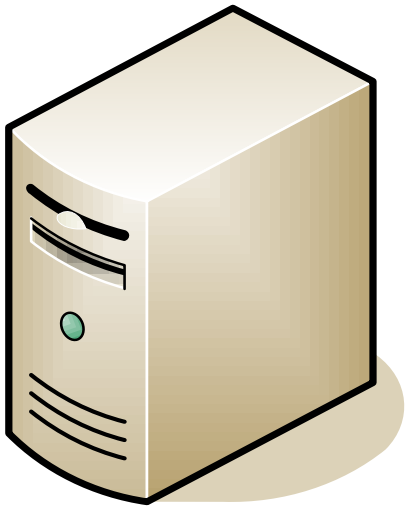
Interoperability Service Mark

OFED: RDMA Services over InfiniBand and Ethernet



OFED is developed to conform to specifications of international standards from IEEE, IETF, T10, IBTA and practices of kernel.org, RHEL, SLES and Microsoft

OFED Offers Transport Independence



Applications — Simulation and modeling, enterprise and Cloud

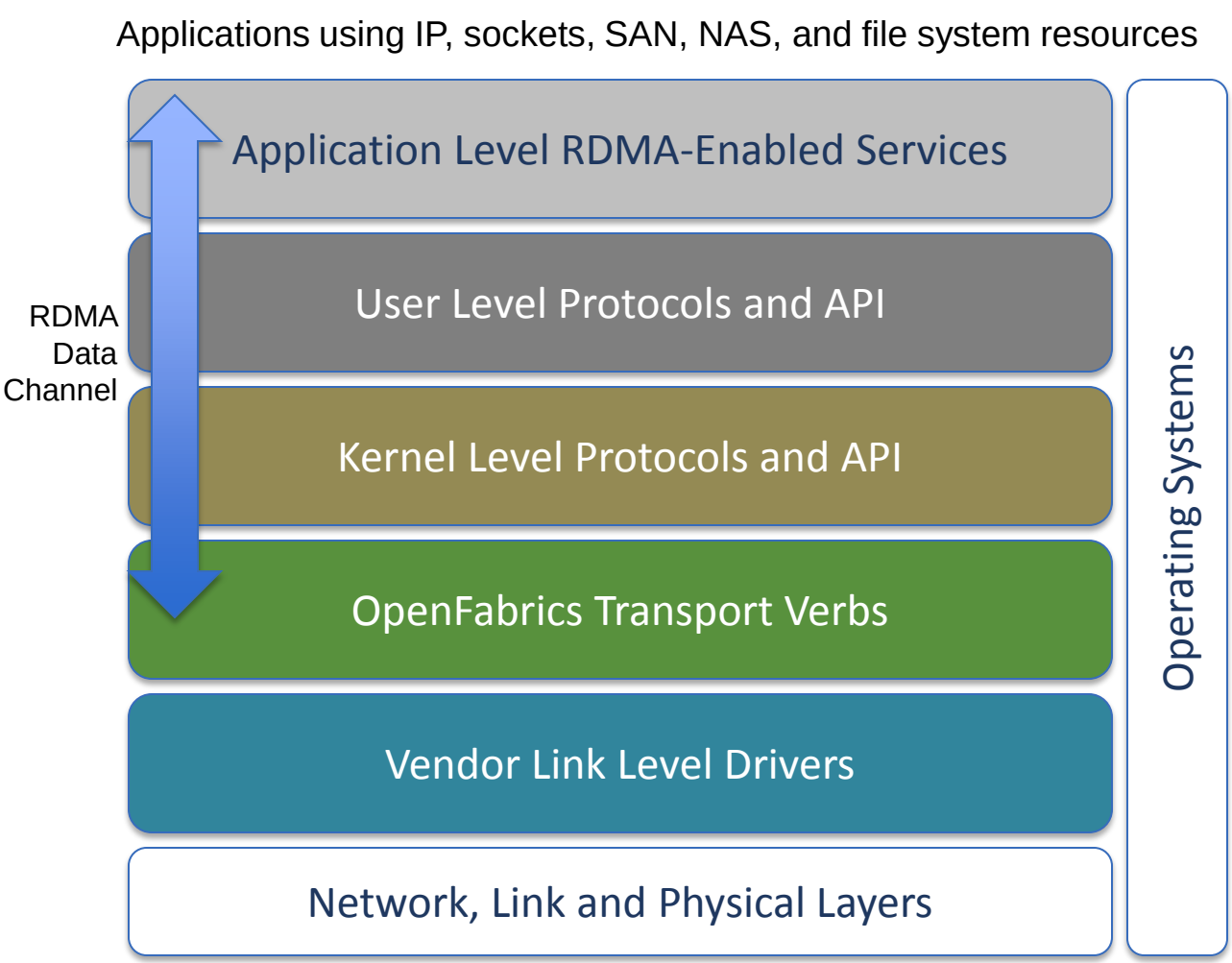
Unified software stack
including Upper Layer Protocols and Drivers for RDMA Services

Operating System

Hardware Adapter — InfiniBand- or Ethernet-based fabrics

- Single software stack
- Users have freedom to choose a fabric solution
- Apps can utilize API for RDMA, kernel bypass, I/O virtualization services
- Allows OS & apps to maximize performance and efficiency

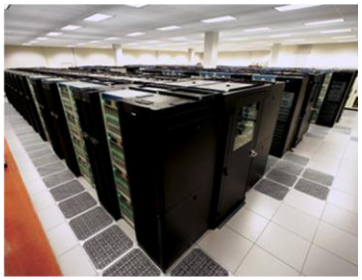
OFED Components and OS Distributions



Various components and derivatives of OpenFabrics software are included in major OS distributions

OFED Applications

Texas Advanced Computing Center
"HPC Cloud", HPC services
4K nodes, 63K cores



TACC

Sikorsky
A United Technologies Company

Sikorsky CH-53K program
Reducing simulations duration from 4 days to several hours

The Jülich Petascale project
The most efficient system in the top10
3K nodes, 26K cores, 274TFlops
92% efficiency

JÜLICH
FORSCHUNGSZENTRUM

GM

General Motors Vehicle Development Process time reduced from 42 month to 18 months

Global online transaction processing application: provisioning time reduced to 12 hours from 200 hours, 30% I/O power savings and 70% reduced cabling

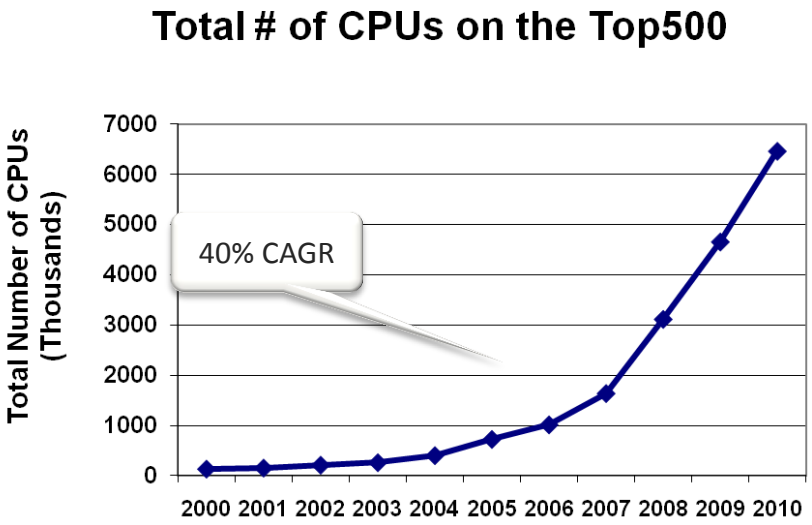
xsigo systems

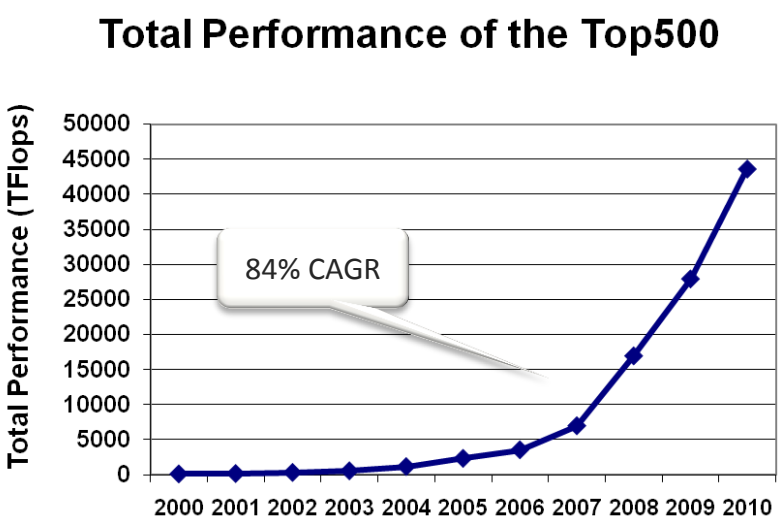
NAVITAIRE

accenture

amazon.com YAHOO! BT GIANT EAGLE

OFED in the TOP500





OFED enables the highest utilization on the TOP500

- Up to 96% system utilization, 50% higher than the 1GigE based systems not using OFED
- Most systems using IB utilize OFED

*According to November 2010 TOP500 list

Licensing and Development

- OFA serves as the code repository
- Dual-license allows for inclusion in both open-source and non-open source operating system environments
  - Code contributed under licenses for GPL **AND** BSD
  - Code licensed from OFA under either GPL **OR** BSD
- Current development focus
  - RDMA technology over InfiniBand & Ethernet networks
  - Linux and Microsoft Windows operating systems

How does the Alliance Work?

Developers contribute open-source code	Often sponsored by vendors or end users In their interest to collaborate on a single robust & high performance stack
Elected Officers and Working Group volunteers	Chairman, Vice Chairman, Treasurer, Secretary and Working Group Chairs
Open contributions and participation	From the industry (both technical and marketing)
Marketing and promotion	Through industry events, tradeshows, press releases and end-user interaction

OFA Working Groups

- Each group is led by an appointed Chair and Vice-Chair
- Any OpenFabrics member is free to participate and contribute

Executive Work Group (XWG)	Delegated to run OFA
Enterprise Work Group (EWG)	Qualified and tested distribution of Linux code. OFED for Linux distributions. Conduct workshops.
Windows Work Group (WWG)	Qualified and tested distribution of Windows code. OFED for Windows distributions. Conduct workshops.
Marketing Work Group (MWG)	Recruiting and promotion. Conduct workshops.
Interoperability Work Group (IWG)	Develops interoperability test plans, manages UNH IOL interoperability test events & results.
Legal Work Group (LWG)	Code contribution and licensing
Technical Advisory Group (TAG)	Identify strategic technology initiatives for OFA

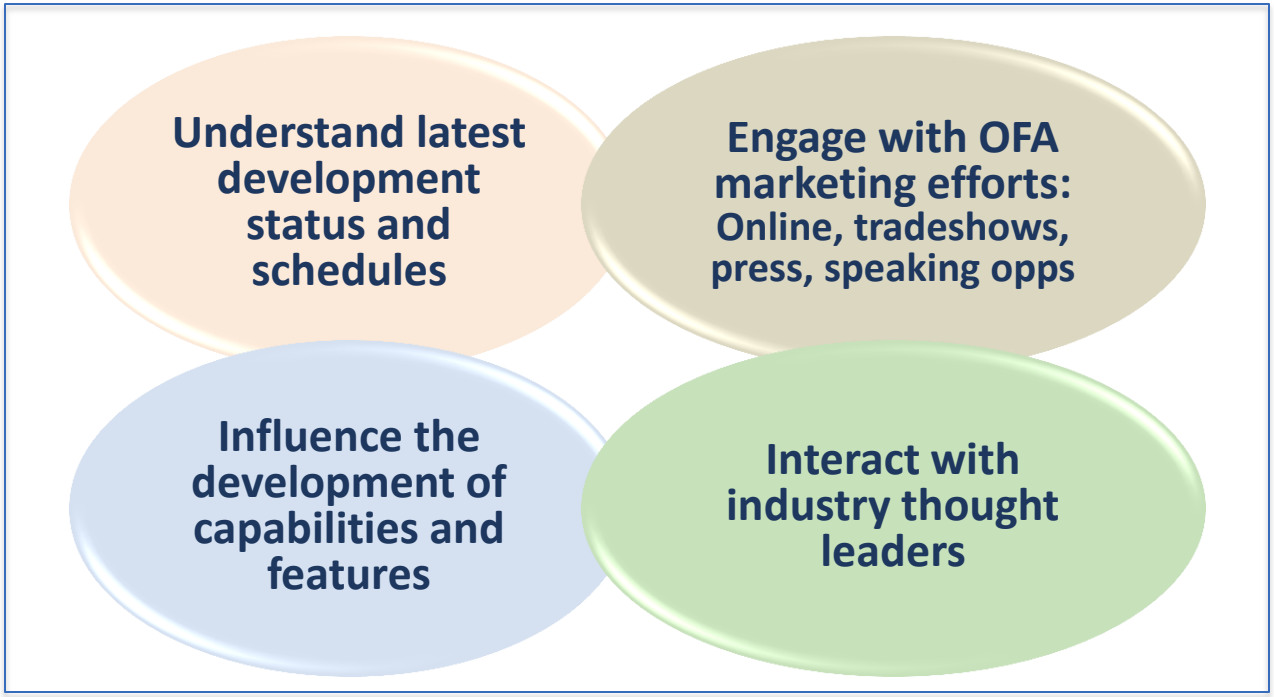
OFA Workshops and Events

- Annual developers workshop
  - OFED software planning based on ISV, OSV, end user and OEM needs
  - Interconnect vendor plans, features and roadmaps
- Bird of a Feather events at the International Supercomputing Conference (ISC) and SC trade shows
- Interoperability events at UNH IOL
  - Twice/year
  - Focus on industry-wide interoperability using OFED

OFA Training

- RDMA/Verbs training curriculum
- Writing Application Programs for RDMA using OFA Software
  - Two-day course that provides app developers with classroom instruction and hands-on experience coding apps directly to the Verbs API using OFED and related software tools
- Introduction to OpenFabrics Software Mini-Course
  - 1-2 hour long course that provides developers, system integrators and IT managers with an overview of the benefits of OpenFabrics technologies, while introducing them to OFED and RDMA concepts
- Full listing of all available courses at openfabrics.org/training

Benefits of Membership



If your organization is using or is interested in using RDMA-enabled or low latency fabric technology, you should join immediately

Six Membership Levels

Promoters ($10k/year, $3k initiation)	Organizations and enterprises that wish to strongly influence the process and features in software created and the accompanying promotional activities to enhance the code they use or provide
Adopters ($5k/year, $3k initiation)	Organizations and enterprises that wish to contribute to and participate in the processes and work of the promoters but do not feel the need to strongly affect the outcomes
Supporters ($1.5k/year, $3k initiation)	Organizations and enterprises that wish to use the OpenFabrics software, leverage the promotional activities, be tied into the work of the Alliance but not necessarily contribute
Academic ($2,000/year)	Educational institutions that wish to contribute to the technology direction of OFED; participate in the development process, release testing and problem resolution; and/or institute OFA education and research into their curricula
Individual ($200 annual)	Individual users or developers of OFED who wish to contribute to the technology direction and participate in the development process, release testing, preparation and problem resolution. Must verify their independence of other orgs
Consulting -- (Free)	Organizations and individuals the Alliance selects

Join Today!

- Key Contacts
  - OFA Chair: Jim Ryan
  - OFA Vice Chair: Scot Schultz
  - Treasurer: Bill Boas
  - Enterprise Working Group Co-Chairs: Tziporet Koren, Robert Woodruff
  - Interoperability Working Group Chair: Rupert Dance
  - Marketing Working Group Co-Chairs: Tom Stachura, Brian Sparks
  - Windows Working Group Co-Chairs: Stan Smith, Ishai Rabinovitz
  - Technical Advisory Group Chair: Lloyd Dickman
- To join the Alliance, review bylaws and sign Membership Agreement
  - Available for download at www.openfabrics.org
- Start attending monthly promoters meetings and working group meetings; contribute as appropriate