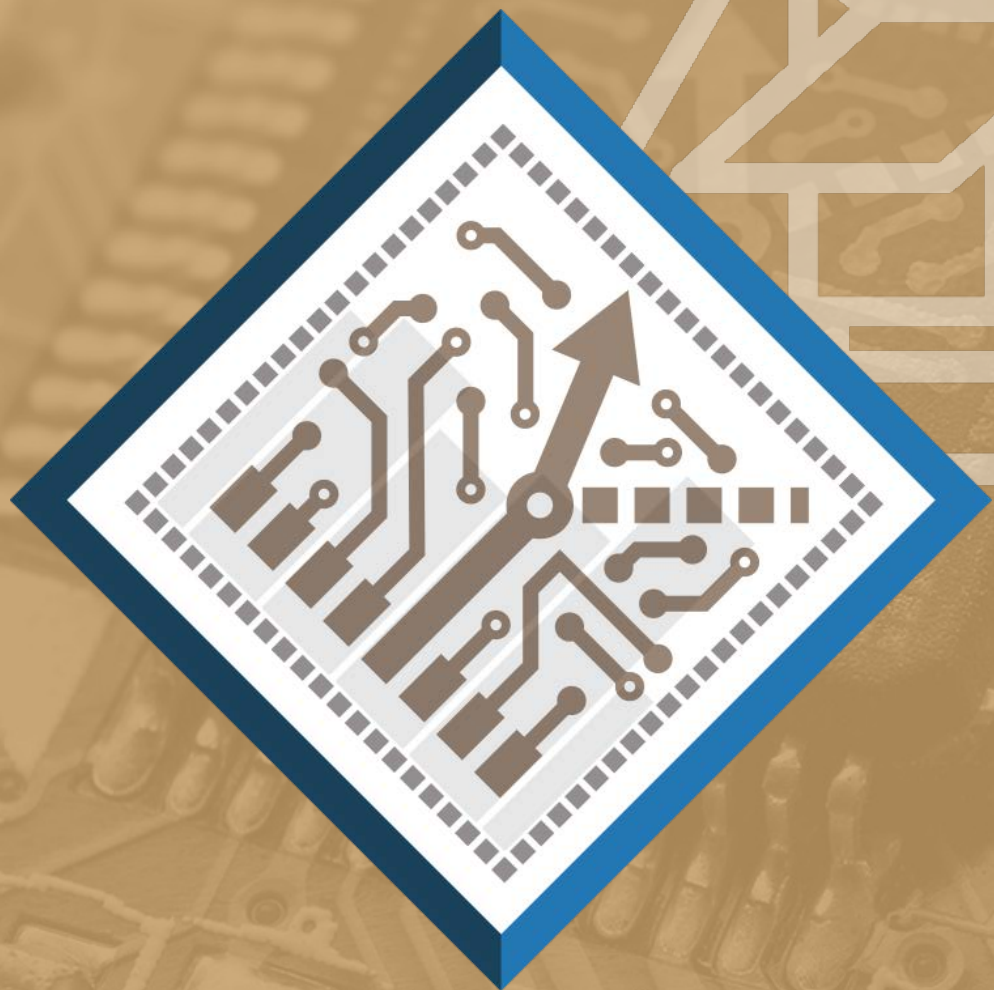




WADE SHEN

PROGRAM MANAGER
DARPA/I2O & MTO



HIERARCHICAL
IDENTIFY
VERIFY
EXPLOIT
(HIVE)

HIVE

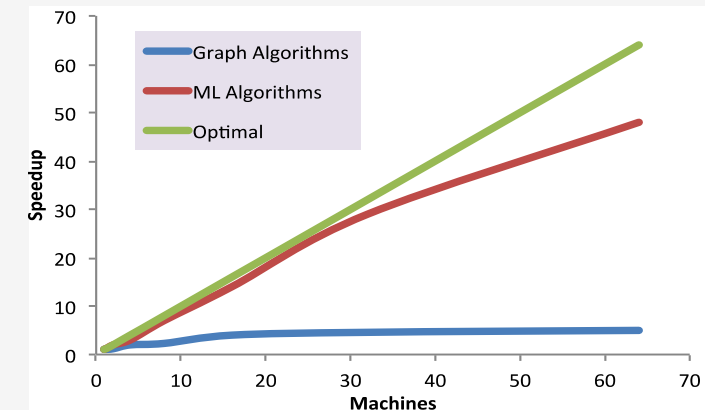
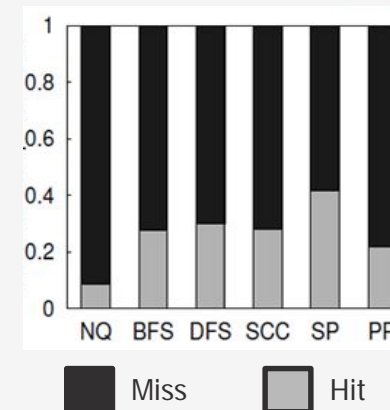
PROGRAM DESCRIPTION

- HIVE: Hierarchical Identify Verify Exploit
Program Manager: Wade Shen – DARPA/MTO

Static and Streaming analytics for trillion-edge graphs

- Program Metrics

- Goal is *1000x performance efficiency*
- 100x hardware; 10x software
- Compared against current state-of-the-art



HIVE

PROGRAM HIGHLIGHTS

- Intel PUMA architecture:
 - Fast small random memory accesses
 - Global memory model
 - High I/O and memory bandwidth
 - Scalable flat network hierarchy
- Software Framework:
 - Modular architecture
 - Leverage existing graph analytics
 - Interoperate with Python science tools

Workflow	Intel Puma	GPU	Speedup
Random Walk	20	0.18	107x
Scan Statistics	13	59.54	0.22x
Graph Search	64	35	1.83x
Triangle Counting	13	0.87	15x
Louvain (community detect)	16	0.03	521x

Average: 129x

HIVE

PERFORMERS

Intel Data Center Group

PI: Joshua Fryman

Hardware Architecture: highly scalable design with balanced memory/compute and flat memory/network hierarchy.

Georgia Institute of Technology

PI: David Bader

Software Research: identify and design graph kernels, primitives and libraries; data structures; algorithms; dataflow representations; APIs; run-time frameworks; and user interfaces.

Pacific Northwest National Laboratory

PI: John Feo

Anaconda

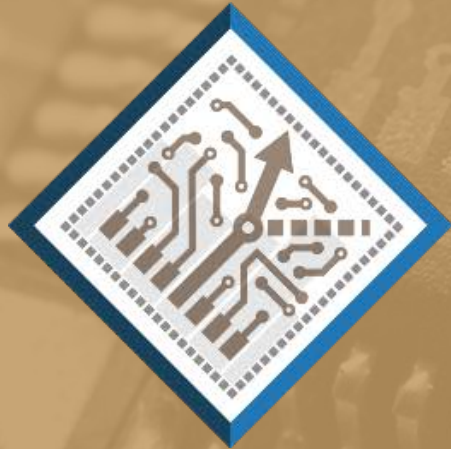
PI: Peter Wang

Software Architecture: modular, flexible approach: support multiple APIs, languages, libraries, and target hardware architectures

Northrop Grumman

PI: Julie Huff

Technology Transition: on-site analysis, ingestion, migration, benchmarking, and demonstration of transition partner workloads and data sets.



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