IBM – Accelerating Technical Computing

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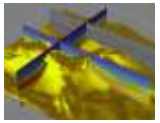
HPC and IBM have long history driving research and government innovation

- Traditional use cases continue to grow

The universe is analyzed

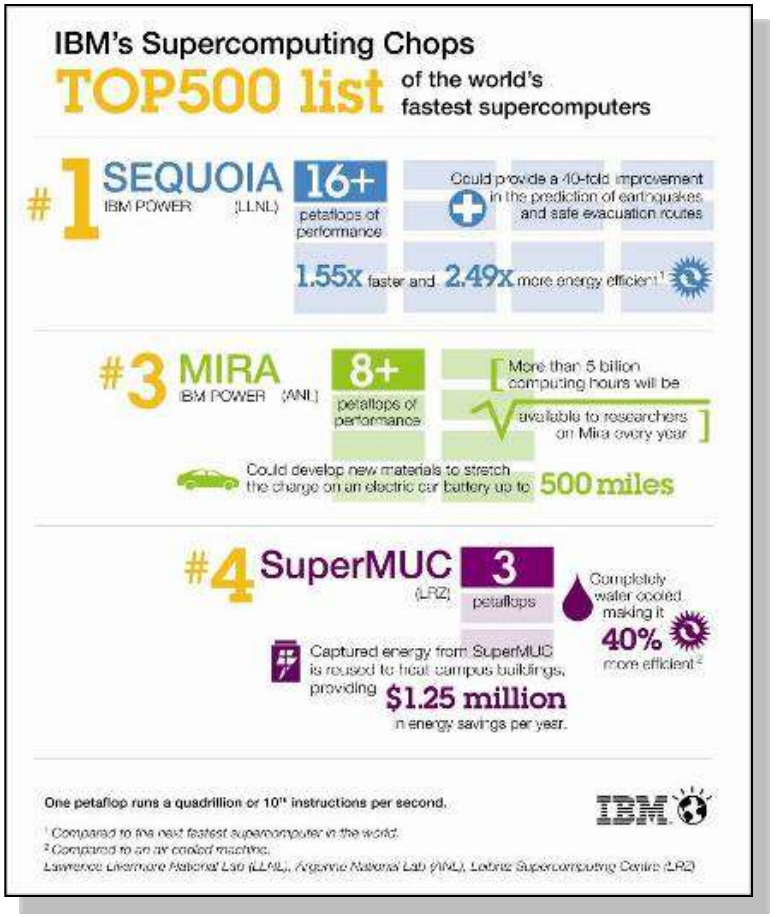
Medical research is conducted



Oil is discovered

Weather is forecasted

- Top500 list
- Largest number and most energy efficient

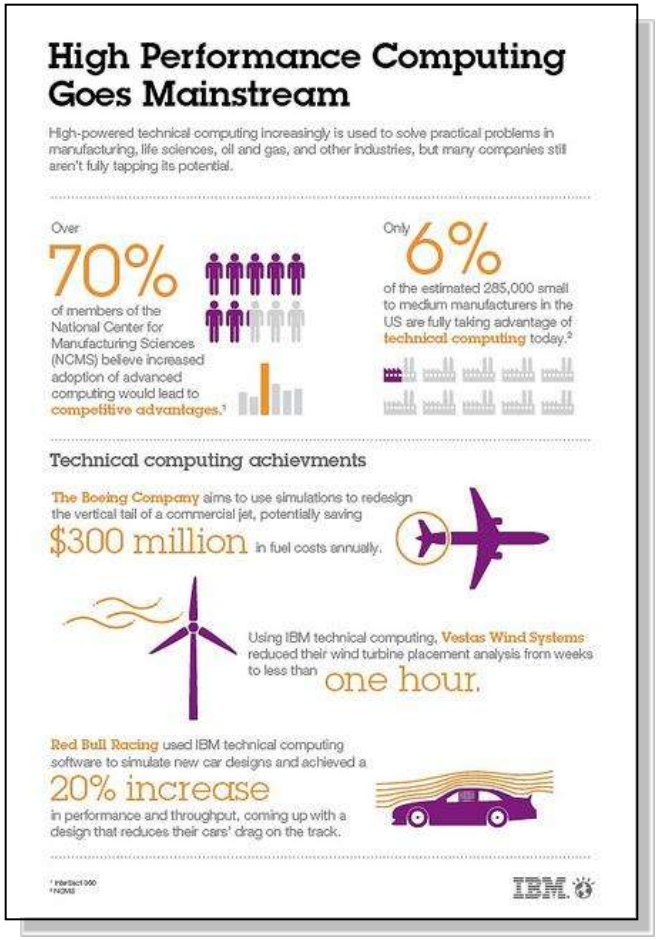


Source: [Top500 list]

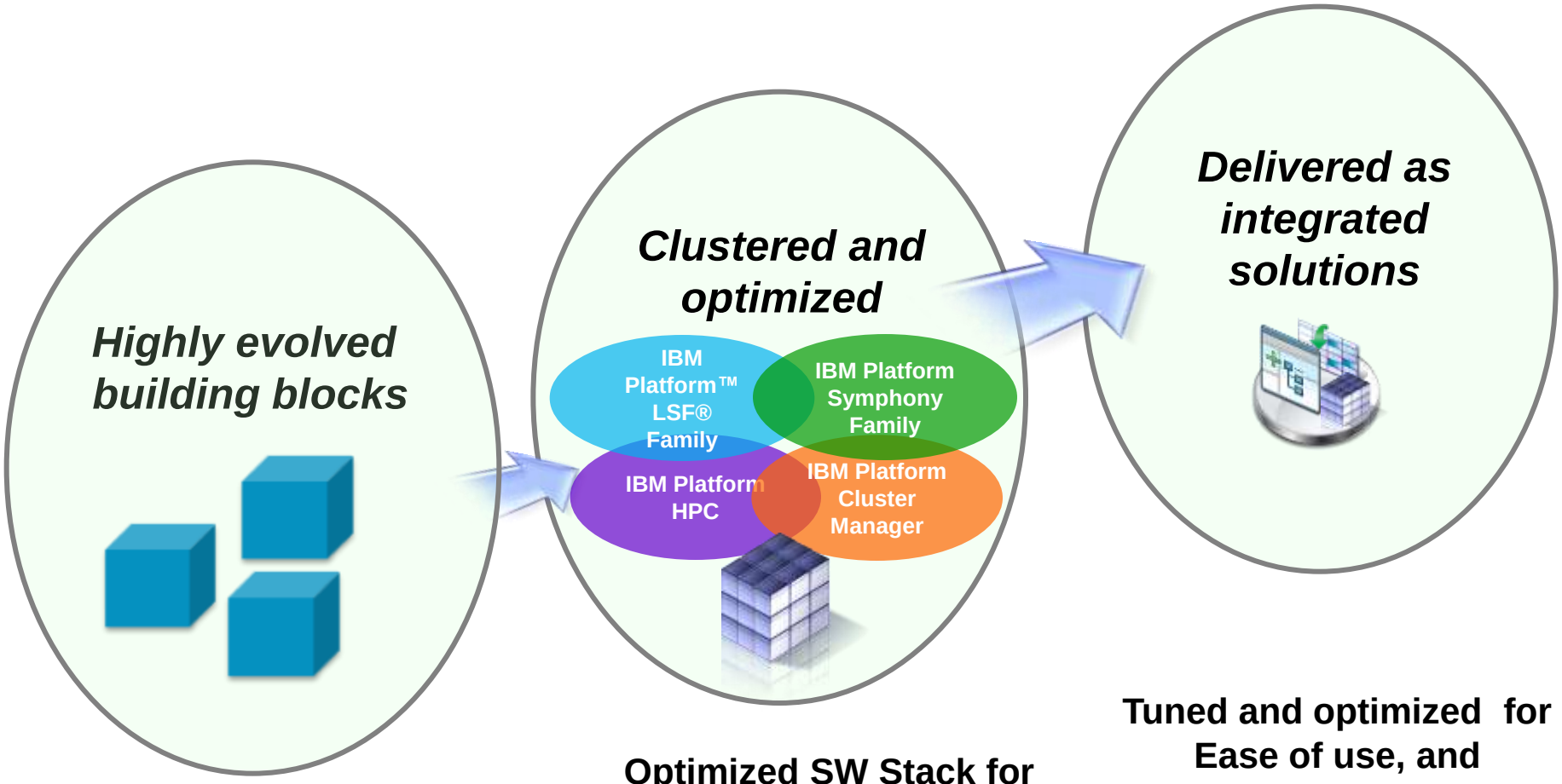
Not just for science anymore, but mainstream business innovation

Accelerate time to business results, reduce costs, and gain competitive advantage

- Business applications require more compute capacity, data management and IT agility
  - Modeling
  - Simulations
  - Analytics (explosion of data)
- Emergence of Software Defined Environments
- Key Life Sciences trends
  - Data explosion and storage
  - Application expansion
  - Convergence big compute with big data, analytics and cloud



Comprehensive, integrated solutions – From self integration to fully integrated solutions – ready to run



IBM Application Ready Solution for Accelrys

Optimized high-performance systems & software for life sciences clusters, grids, clouds

Easy to use, performance optimized solution architected for the Accelrys Enterprise Platform NGS Collection

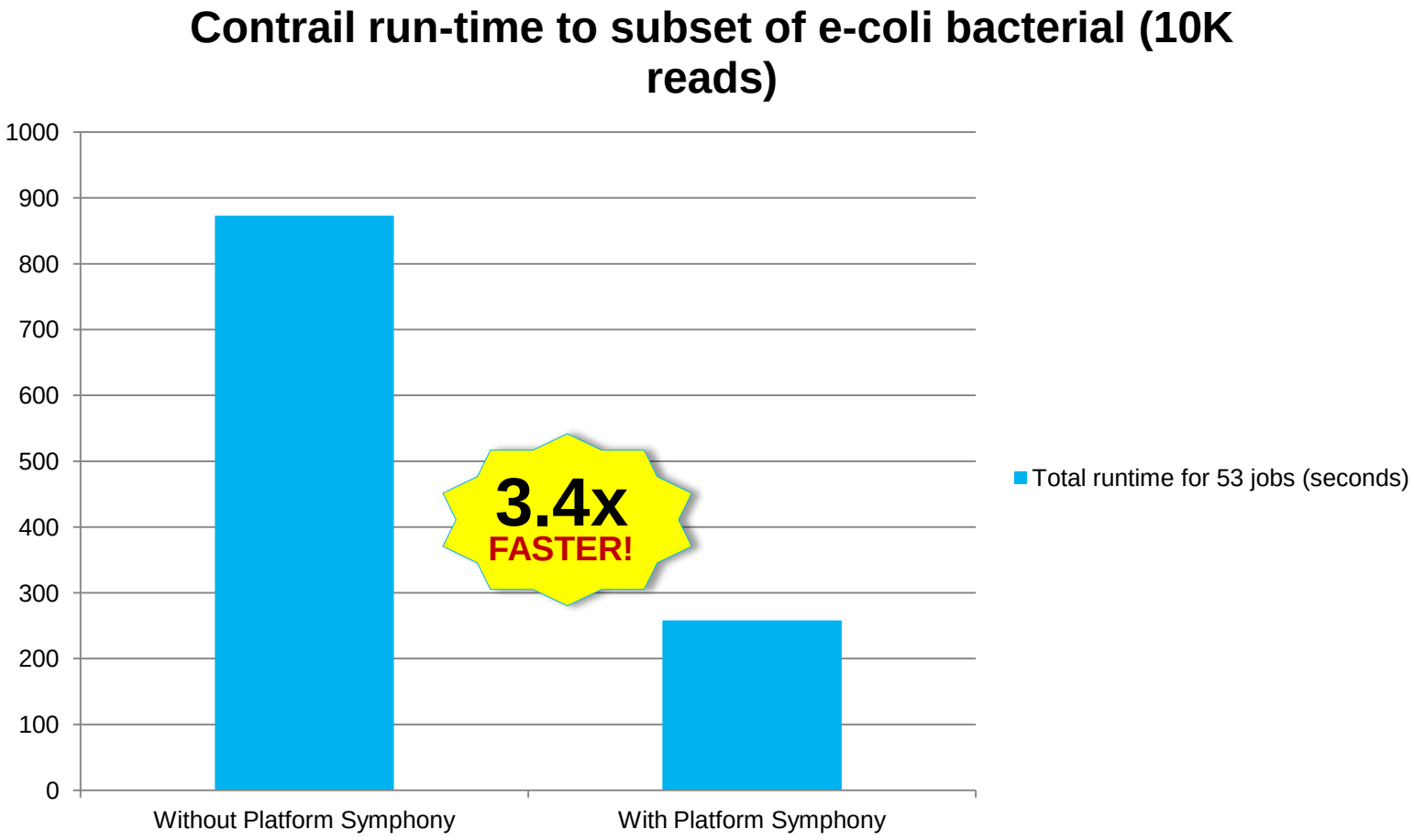
- Accelerated mapping, variant calling and annotation for shortened design cycles
- Ease of procurement, deployment, use, management and access to cluster resources
- Improved administrator and user productivity, reduced training requirements
- Scalable I/O performance for NGS workloads
- Solution-level support from IBM Technical Computing

"The NGS Collection for Pipeline Pilot, combined with the IBM Application Ready Solution, provides a turnkey NGS analysis solution with all the required high performance hardware: General Parallel File System, high speed networking, and storage, to support our customers' most demanding workloads."

- Matt Hahn, Senior Vice President and Chief Technology Officer

Use Case	Next Generation Sequencing		
Workload	One human sized genome/week	Two to five human sized genomes/week	More than three human sized genomes/week
Head Node - x3350M4	Single	Dual	Dual
Compute - Number x240 Flex Nodes	3	6	12
Compute - Disk per Node	2 TB	2 TB	2 TB
Compute - Memory per Node	128	128	128
IBM DS3500 Storage or Storwize V7000 Unified (TB)	25	50	100
10 Gigabit switch / adapters	yes	yes	yes
FDR IB switch / adapters	no	no	no
Management Software	IBM Platform HPC, IBM GPFS		

Platform Symphony impact on Contrail performance



	Without Platform Symphony	With Platform Symphony	Speed-up factor
Total runtime for 53 jobs (seconds)	873	258	3.4

New System X platform launch this week – watch tomorrow!

1 **IT Your Way**

- Multiple config options (buy how you want)
- Option to ship ready to turn on
- Power eff built into the system
- Tight software integration (LSF)
- Open standards back by IBM support

2 **Powerful Yet Simple**

- Base = robust & dense compute
- Native expansion for upgrade
- Simple to install, service, maintain (from the front)

3 **Scale enabled for everyone**

- Industry leading performance
- Start any size and easy transition to clusters from workstations
- Platform Computing software

IBM Power Systems

Next Gen Applications Big Data & Analytics

Cognos SPSS

Retail

Healthcare

- Power + DB2 Blu + Flash
- New workloads
- Industry solutions

Cognitive computing

IBM WATSON

- Watson: Linux on Power
- Inspire to innovate
- Art of the possible

Open Platform for Choice

Linux AIX i for Business

KVM openstack SmartCloud

OpenPOWER Consortium

- Choice and flexibility
- Linux, AIX, IBM i
- Available on premise or through the cloud

Leveraging 3rd Party ISVs and IBM SWG Ecosystem

Watson enables three classes of cognitive services

Ask

- Leverage vast amounts of data
- Ask questions for greater insights
- Natural language inquiries
- e.g. Next Generation Chat → Interactive

Discover

- Find the rationale for given answers
- Prompt for add'l inputs for better responses
- Create consideration of new ideas
- e.g. Next Generation Search → Discovery

Decide

- Ingest and analyze domain sources, info models
- Generate evidence based decisions with confidence
- Learn with new outcomes and actions
- e.g. Next Generation Apps → Probabilistic

Who needs this information?

Physicians
Other Clinicians
Care Coordinators
Researchers

Executives
Business Analysts
Claims
Fraud Detection

Knowledge Workers

Other Systems and Applications

IBM Watson at work in Health Care

Product 1: Utilization Management

Streamlines the review processes between a patients' physician and their health plan:

- Speeds treatment approvals, reduces waste
- Enhances quality and consistency of patient care
- Moves patients toward treatment more quickly
- Trained on some of the highest volume medical policies

1600+ Providers

WELLPOINT

1500+ Practitioners

Product 2: Oncology Diagnosis and Treatment Advisor

Assists oncologists and researchers in identifying individual treatment options for patients diagnosed with cancer:

- Based on patient records, array of guidelines and published research
- Trained by industry experts at MSK, designed by oncologists
- Leverages 1.5M patient records and years of longitudinal data
- Synthesizes patient data with standard guidelines, best practices and medical insights

Early Adopters

MEMORIAL SLOAN-KETTERING CANCER CENTER

The OpenPOWER Consortium

What is OpenPOWER?

OpenPOWER Consortium is an industry body comprised of passionate innovators who come together to pool their resources around a single purpose to:

- Innovate across a complete server stack based upon the IBM POWER architecture
- Produce open hardware, software, firmware and tools through collaborative innovation
- Innovate customized and highly advanced servers, subsystems, components
- Leverage complementary skills and investment from the member companies
- Become operational this year

Why did we form this consortium?

- To enable broader innovation in the industry
- Provide alternative architectures
- Enhance the ecosystem around POWER

IBM Technical Computing comprehensive portfolio uniquely addresses supercomputing and mainstream client needs

Power Systems™
Engine for faster insights

PureSystems™
Integrated expertise for improved economics

System x®
Redefining x86

Technical Computing for Big Data

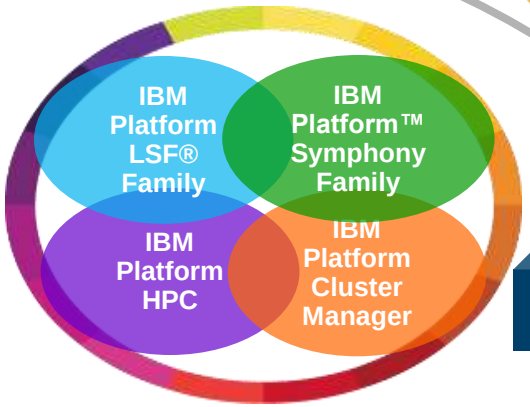
Blue Gene®
Extremely fast, energy efficient supercomputer

System x iDataPlex®
Fast, dense, flexible

HPC Cloud

System Storage®
Smarter storage solutions

Parallel Environment



xCAT

GPFS™

GPFS™ Storage Server
Big data storage

Intelligent Cluster™
Factory-integrated, interoperability-tested **system** with compute, storage, networking and cluster management

Thank you!

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