# A New Era in Technical Computing Powerful.  Comprehensive. Intuitive

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# HPC and IBM have long history driving research and government innovation
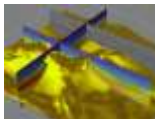
- Traditional use cases continue to grow

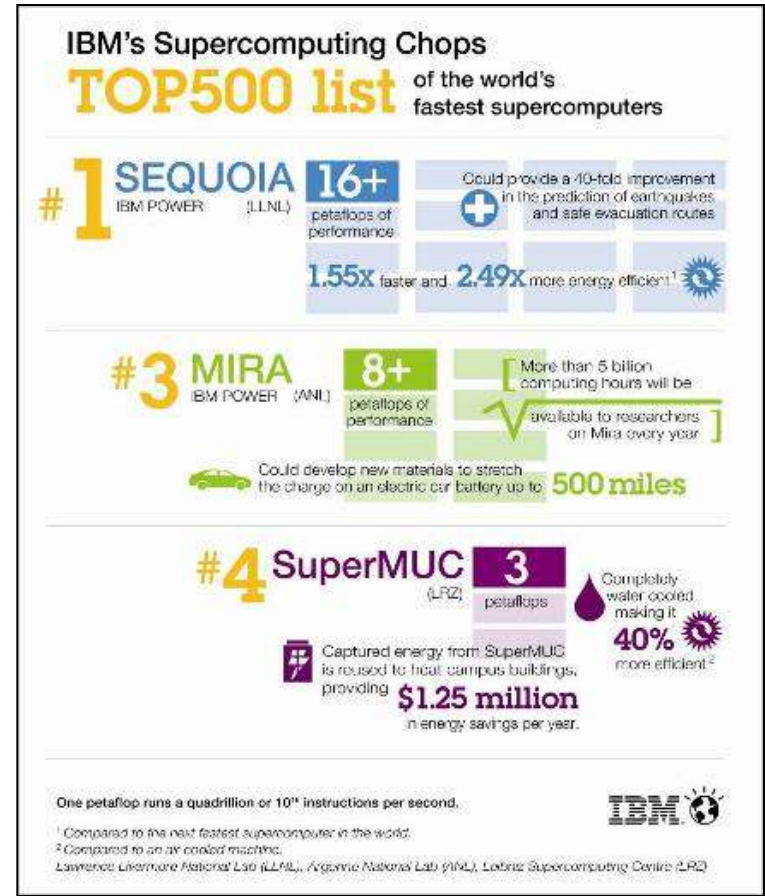  The universe is analyzed

  Medical research is conducted

  Oil is discovered

  Weather is forecasted

- Long Top500 list- Sequoia was 1.5x faster than the previous #1

- Largest number (213) including largest in US and Europe and most energy efficient
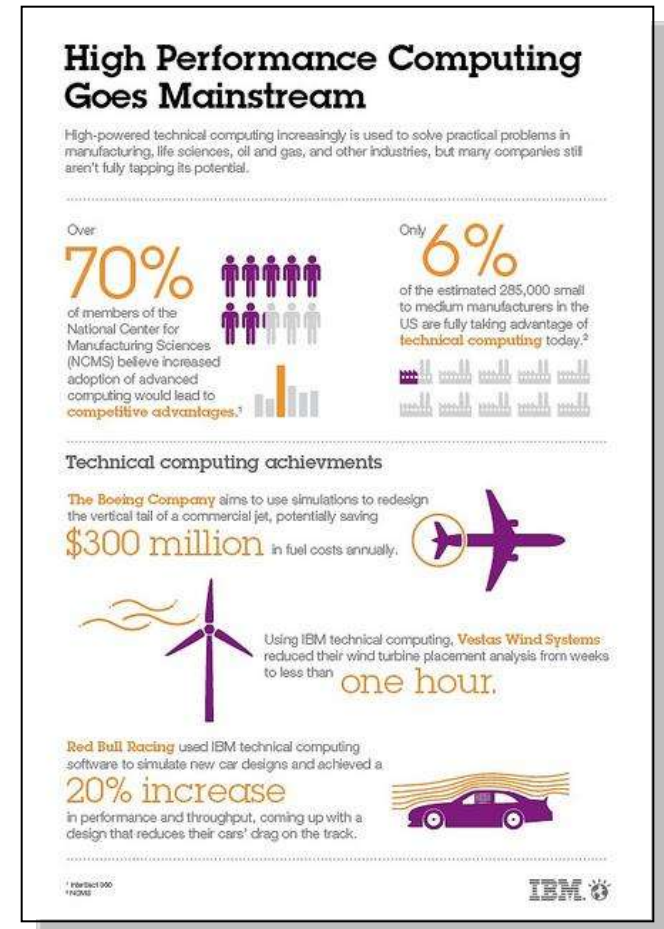


**IBM's Supercomputing Chops**

**TOP500 list** of the world's fastest supercomputers

**#1 SEQUOIA** IBM POWER (LLNL) **16+** petaflops of performance — Could provide a 40-fold improvement in the prediction of earthquakes and safe evacuation routes

**1.55x** faster and **2.49x** more energy efficient[1]

**#3 MIRA** IBM POWER (ANL) **8+** petaflops of performance — More than 5 billion computing hours will be available to researchers on Mira every year

Could develop new materials to stretch the charge on an electric car battery up to **500 miles**

**#4 SuperMUC** (LRZ) **3** petaflops — Completely water cooled making it **40%** more efficient[2]

Captured energy from SuperMUC is reused to heat campus buildings, providing **$1.25 million** in energy savings per year.

One petaflop runs a quadrillion or 10^15 instructions per second.

[1] Compared to the next fastest supercomputer in the world.
[2] Compared to an air cooled machine.
Lawrence Livermore National Lab (LLNL), Argonne National Lab (ANL), Leibniz Supercomputing Centre (LRZ)

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*Source: Top500 list, June 2012*

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# 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)

- **2012 - IBM acquired 'Platform Computing'**

- **Need for scale-out, workload optimized systems – compute and data intensive**



## High Performance Computing Goes Mainstream

High-powered technical computing increasingly is used to solve practical problems in manufacturing, life sciences, oil and gas, and other industries, but many companies still aren't fully tapping its potential.

Over **70%** of members of the National Center for Manufacturing Sciences (NCMS) believe increased adoption of advanced computing would lead to **competitive advantages.**[1]

Only **6%** of the estimated 285,000 small to medium manufacturers in the US are fully taking advantage of **technical computing** today.[2]

### Technical computing achievments

**The Boeing Company** aims to use simulations to redesign the vertical tail of a commercial jet, potentially saving **$300 million** in fuel costs annually.

Using IBM technical computing, **Vestas Wind Systems** reduced their wind turbine placement analysis from weeks to less than **one hour.**

**Red Bull Racing** used IBM technical computing software to simulate new car designs and achieved a **20% increase** in performance and throughput, coming up with a design that reduces their cars' drag on the track.

[1] InteSect 300
[2] NCMS

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# IBM expanding from Supercomputers to mainstream Technical Computing

## Technical Computing

| Supercomputing | Mainstream Technical Computing |
|---|---|
| Solve grand challenge problems cost effectively | Accelerating applications, reducing cost with high-performance infrastructure |
| • Government organizations<br>• R&D, Higher-Ed<br>• Gov. Lab officials, Program Dir. | • Large enterprise, mid-market clients<br>• FSS, Auto/Aero, Life Sciences<br>• LOB, CIO, VP IT Strategy,  IT Mgr |
| • Direct; Select business partners | • Business Partners(VAD,VAR),  Direct |

## Enterprise Computing

• Transactional systems / operational (accounting, HR, finance, …)
• Driven by RAS: reliability, availability, serviceability
• Slow adoption of new technologies, algorithms, and approaches

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# Trends driving mainstream Technical Computing growth

## Market Trends

Increased competitive pressures to bring better products to market faster

Explosion of data available to make better decision making

Increased need for flexibility and agility

Lower total cost of ownership solutions / ready to deploy

## Technology Trends

Unceasing demand for more compute capacity and more complex environments (e.g., accelerators, heterogeneous)

- Rise of big data clusters and programming models
- Convergence compute and big data

- Clusters → Grids → Clouds
- Integrated workload and infrastructure management

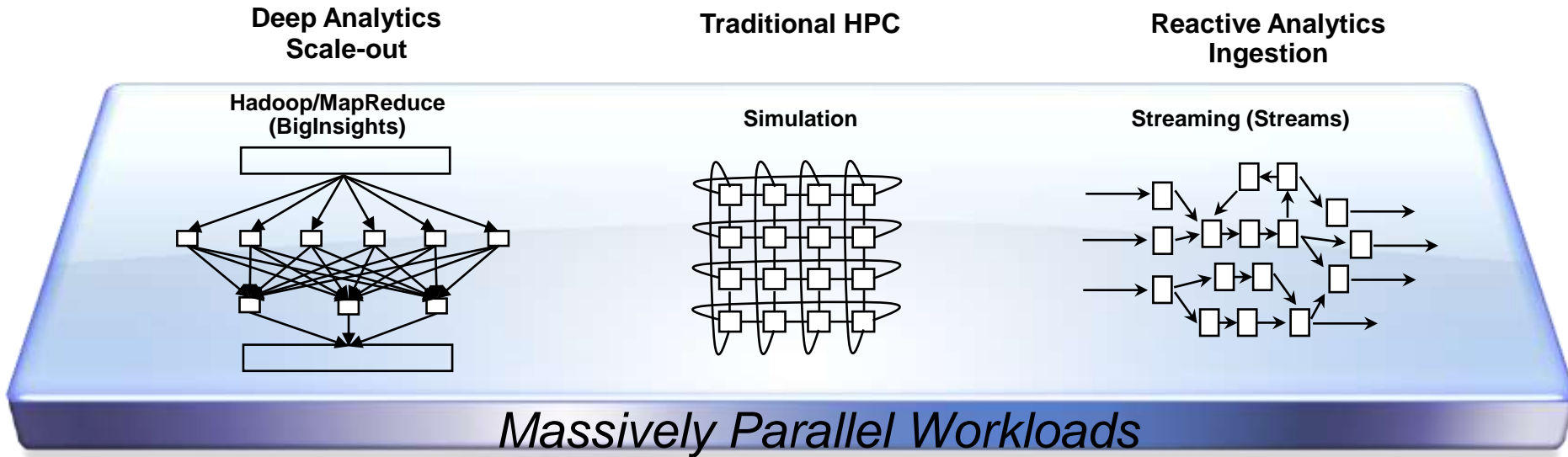Integrated bundles of software and hardware focused on ease of use

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# Trends driving mainstream Technical Computing growth

## Technology Trends

## IBM Strategy

Unceasing demand for more compute capacity and more complex environments

Offer Management software and systems able to embrace complexity, accelerate application performance and decrease costs

- Rise of big data clusters and programming models
- Convergence compute and big data

Integrate big data, storage, compute, and file management on a shared infrastructure for high performance and scalability

- Clusters → Grids → Clouds
- Integrated workload and infrastructure management

- Workload-driven dynamic cloud infrastructure management
- Private and hybrid cloud capabilities

Integrated bundles of software and hardware focused on ease of use

Integrated solutions optimized for verticals

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# Growth of Big Data in Technical Computing

**Deep Analytics
Scale-out**

**Traditional HPC**

**Reactive Analytics
Ingestion**

**Hadoop/MapReduce
(BigInsights)**

**Simulation**

**Streaming (Streams)**

*Massively Parallel Workloads*

## IBM's Proven Scalable Software
## Infrastructure

- Advanced Application Development Environment
- Workflow Optimized Runtime
- Flexible  Resource Management
- Robust / Reliable Systems Management
- High Performance File System
- Better End User Experience

*Develop*

*Manage*

*Apply*

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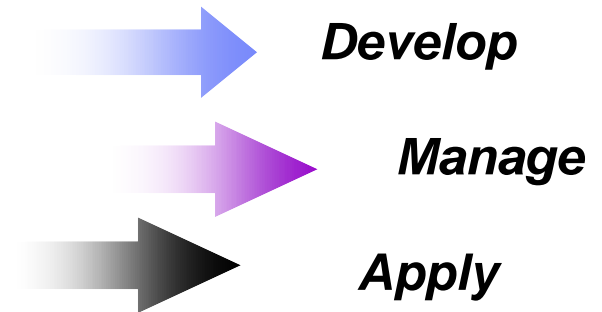
# IBM Technical Computing comprehensive portfolio uniquely addresses supercomputing and mainstream client needs

**Power Systems™**
Engine for faster insights

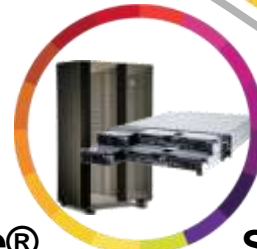**PureSystems™**
Integrated expertise for improved economics

**System x®**
Redefining x86

**Technical Computing for Big Data**

**Blue Gene®**
Extremely fast, energy efficient supercomputer

**System Storage®**
Smarter storage solutions

**System x iDataPlex®**
Fast, dense, flexible

**HPC Cloud**

**Parallel Environment**

**IBM Platform LSF® Family**

**IBM Platform™ Symphony Family**

**IBM Platform HPC**

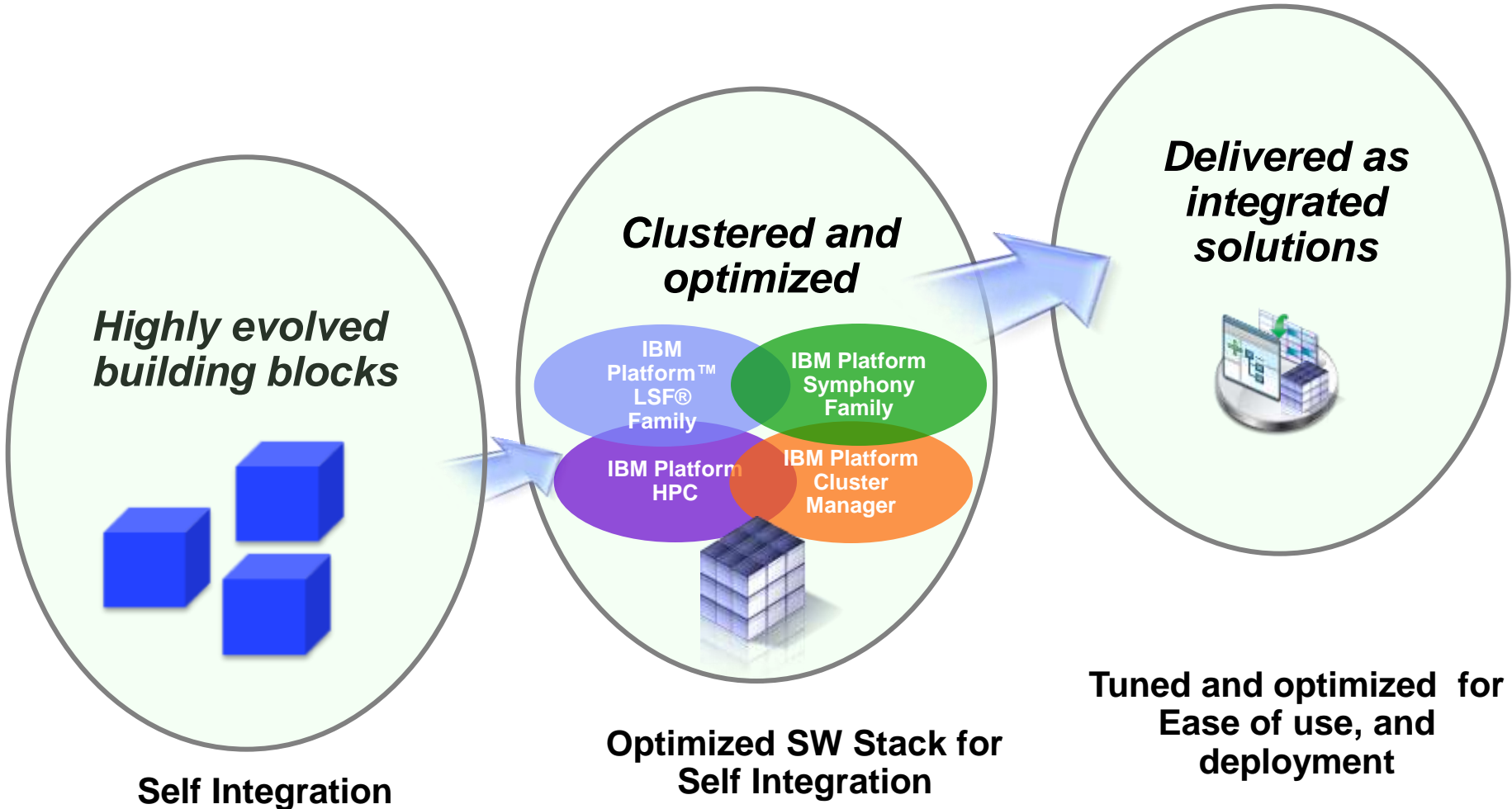**IBM Platform Cluster Manager**
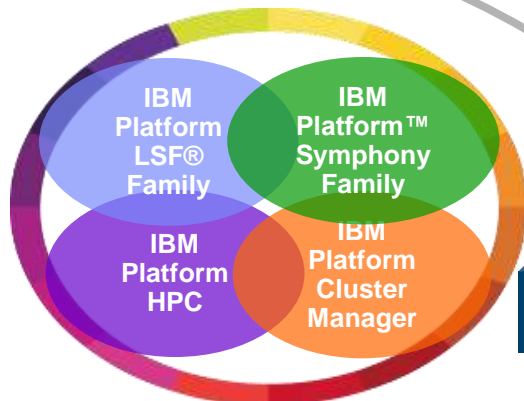
*xCAT*

**GPFS™**

**GPFS™ Storage Server**
Big data storage

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

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

*Highly evolved building blocks*

*Clustered and optimized*

*Delivered as integrated solutions*

IBM Platform™ LSF® Family

IBM Platform Symphony Family

IBM Platform HPC

IBM Platform Cluster Manager

**Self Integration**

**Optimized SW Stack for Self Integration**

**Tuned and optimized for Ease of use, and deployment**

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# Customer examples

### Leading Formula 1 race team
- Complex simulations and analysis with short time frames and strict regulations on cluster size
- Ease-of-use, application license optimization, high IT productivity

### Large global financial services provider
- Market analysis, pricing and risk analytics/ compliance for 200+ applications with low average IT utilization
- 14 business units sharing grid across 4 data centers
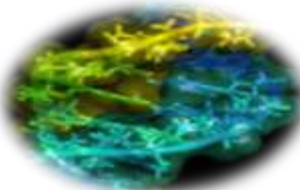
### Leader in market driven innovation and science
- Global research for HPC, big data and analytics with dynamic compute and Hadoop clusters
- Highly secure HPC cloud shareable across domains

### Leading major aircraft manufacturer
- Complete aircraft design and simulation across global teams
- Reducing time to market with highly automated workflow driven processes, application license optimization, heterogeneous shared services and optimal job placement

# Thank you!